

Reform *for* Resilience

Healthy Growth



The international alliance to make COVID-19 a catalyst for strengthening the global institutional commitment to a healthier and more resilient model of global growth.

Interim Progress Report

June 2021

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Foreword from Commission Co-Chairs

From its emergence in Wuhan in the autumn of 2019, the COVID-19 virus has swept across the globe, testing the strength, adaptability and resilience of the global community, individual nations, cities, neighborhoods, families and individuals.

COVID-19 has revealed that the world was not prepared for a pandemic that we had every reason to anticipate. Yet we neglected to adequately invest in developing and maintaining global health system resilience. Consequently, the COVID-19 pandemic should serve as a wake-up call to global leaders every bit as significant – and urgent – as the Global Financial Crisis (GFC) of more than a decade ago, and the worsening climate emergency of today. They are linked. The pandemic, the GFC, and the climate emergency are all crises of resilience, testing our ability to adapt and thrive.

We need to learn the lessons. Fast. The current crisis is still evolving, and the virus is still mutating. The tragedy in India is a stark reminder of the scale of the ongoing challenge and the need to urgently shape new global partnerships. G7 leaders must commit their nations, the world's wealthiest, to ensuring that no resource is spared until all communities have access to proper disease surveillance, testing and global vaccination capabilities.

As G7 leaders gather we need to address the following challenges:

- The **urgent**, immediate next stage of controlling the '3rd wave' surge of the Delta variant now sweeping through South and East Asia. In this pandemic, no country is safe until every country is safe. Global leaders of the richest nations at the G7 and G20 need to act with urgency to tackle the problems of **global vaccine availability; remove barriers to vaccine compliance; and support appropriate use of Vaccine Passports, adequate quarantining and** better private-public partnerships for disease **surveillance and data sharing**.
- The important lessons for **future pandemic preparedness**. Too much of the 'pandemic preparedness' agenda assumes that pandemics are rare, 'one in a hundred year' events and that the development of a vaccine alone is enough to end the crisis. It is not and it is dangerous to assume otherwise. We need a global architecture for universal access to vaccines. The pace of globalization in recent years has led to a number of serious infectious disease threats – SARS, Ebola, Zika – which have not become pandemics. COVID-19 has led to the first time that our now globalized economy and society have been confronted with the same pandemic at the same time. Our world is more connected than ever, a virus can spread at the speed of a jet airplane, and just as we can compare national responses in a way not seen before, so we can expect that this type of global health emergency will become the new normal.

AND

- The vital longer-term lesson of the coronavirus pandemic as a wake-up call for serious strengthening of global **institutional commitment to health economic resilience**: recognizing that the pace of globalization and climate change is increasing the risk of phytosanitary and respiratory disease outbreaks.

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This independent Commission brings together experts from across the fields of health and life sciences, business, finance, and global political leadership at the highest level, to help inform the 2021 policy ‘reset’ that the current pandemic has rightly triggered. This Interim Report outlines:

- Our work over the last 9 months
- Our Key Findings
- Our Specific Recommendations
- Our plans for developing practical policy tools to help governments, cities, and companies ensure GDP growth delivers population health and enhanced economic resilience.

As G7 leaders gather, they need to recognize that none of us are safe until all of us are safe.

We are making a number of specific recommendations in three key areas:

- A. Urgent prioritisation of global distribution of COVID-19 vaccine doses. At present, COVAX is the only truly multilateral effort for global vaccination against COVID-19. There are billions of doses available in the world, but we need urgent co-operation across sectors, including public and private, to get them to the countries and communities most in need.***
- B. Urgent prioritization of developing and above all sustaining over time multilateral engagement in global disease surveillance infrastructure, workforce and programmes to identify and address new and reemerging disease threats.***
- C. Serious structural commitment to rebuilding economic, health and social systems that are resilient, equitable, and environmentally sustainable.***

Long Term Resilience by Design

Just as the GFC revealed a systemic weakness in the global financial system – and triggered important work by the OECD, IMF, and the World Bank to address it – so COVID-19 has revealed systemic weaknesses in both global and national health and economic resilience.

Tackling these structural weaknesses exposed by the pandemic must be central to our post-COVID-19 policy reset.

We need to make this a ‘Bretton Woods’ moment for global health.

As global leaders emerge from the COVID-19 pandemic, we must seize the opportunity to learn the lessons and make this crisis a catalyst for serious reforms. Reforms both for improving the health resilience of economies – but also for looking more deeply at the issue of ‘healthier growth’ alongside cleaner growth.

Cleaner growth and healthier growth go together. Many of the changes to our traditional economic model required to deliver decarbonization are the same changes required to tackle some population health issues – notably the cardio-metabolic-respiratory chronic disease problems related to obesity. Greener cities are cooler, and they encourage walking, cycling, and mass transit instead of driving cars. All of the climate-conscious changes to our built environment will also support a healthier lifestyle.

These priorities are not just the responsibility of governments. Business is, more than ever, taking the lead in the battle to cut emissions and slow the pace of global warming. Thus, in this campaign for a healthier and more resilient world, we will need to harness the innovation and entrepreneurship of

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the private sector. Broad, multisectoral coalitions will be the way to tackle the current and future challenges posed by pandemics, noncommunicable diseases, climate change and obesity, among others.

This won't just happen. It needs leadership – from those in government, business and the science of healthier and cleaner growth.

This Commission has been created to help shape the new models, metrics and practical policy reforms to help leaders - in the public and private sectors – deliver the changes needed for healthier growth. Through our ongoing work with the OECD, G20, World Economic Forum, Cambridge Public Health, our global network of hubs and academic partners, and the other initiatives in this post-pandemic policy 'reset,' we look forward to setting out our Final Recommendations at our summit in November.

José Manuel Barroso

Malcolm Turnbull

Michelle A. Williams

José Manuel Barroso

Malcolm Turnbull

Michelle A. Williams

The Opportunity: Harnessing COVID-19 as a catalyst for new approach to health economic resilience.

The long term structural economic and geopolitical legacy of COVID-19 will be vast. Just as the GFC triggered a major policy reset and institutional strengthening of the global financial system, so too COVID-19 will require a serious 'reset' of the commitment of developed nations to national and global health security and resilience.

COVID-19 has demonstrated something which must be put at the heart of any series post-COVID-19 policy response. In many of the most developed global economies there has been too little attention paid to **Health Economy**: the structural relationship between Health and Wealth. The pandemic has exposed some serious systemic weaknesses in the global policy architecture and governance framework for global health economy:

1. An assumption that the progress in the 20th century with eradicating diseases like smallpox, cholera and typhus from advanced economies means we can stop worrying about the risk of infectious diseases like this to our health and prosperity.
2. An assumption that economic growth and prosperity inexorably lead to improved health. COVID-19 has highlighted all too tragically that in fact the most prosperous economies face exposure through globalisation to a threat of evolving pathogens driven by our human behaviours related to environments and antimicrobial approaches, and that the chronic disease weaknesses associated with prosperity, along with persistent inequalities – most notably obesity related cardio metabolic and respiratory disease – increases the susceptibility of both individuals and economies to infectious disease.
3. A lack of understanding of the real economic cost of disease and value of health – in both advanced and less developed economies – has led to a lack of suitable policy frameworks, data collection, metrics, models and incentives to support healthier growth.

Tackling these structural health weaknesses and boosting our health resilience must be central to our post- COVID-19 policy reset.

In this Interim Report we set out some of the Key Findings we believe policymakers need to be focusing on if we are going to make COVID-19 a catalyst for a serious commitment to strengthening the global and national architecture and commitment to boosting health resilience:

1. Our Key Findings and Lessons from the first 16 months of this pandemic.
2. Our urgent recommendations to the G7 as it gathers in the UK next week.
3. Our work on a new model of health economic resilience to help frame practical policy interventions to help leaders on the frontline of businesses, local and national government make COVID-19 a catalyst for healthier and more sustainable growth for a more resilient global economy.

This is the work the Reform for Resilience Commission is developing over the rest of this year in the build up to our November 2021 Summit, with our Regional Hubs, partner institutes and through our collaboration with the OECD, WEF, PHSSR and the G20 and B20 to make the case for a serious, strategic and systemic strengthening of global and national commitment to strengthening health economic resilience.

George Freeman

George Freeman MP
Convenor, The Reform for Resilience Commission

The Commission: Founders, Commissioners, Partners & Regional Hubs

As global leaders in 2021 confront the legacy of COVID-19, the Reform for Resilience Commission has been convened to bring together internationally respected leaders from business, health and public policy committed to improving Health Resilience and make recommendations about how economic growth can be used to improve the health of the population.

2021 has seen a welcome plethora of projects, initiatives and commissions to help ensure the lessons of this pandemic are properly learnt. The Reform for Resilience Commission brings a particular focus on 3 key issues:

- **Internationalism:** making the COVID-19 pandemic a catalyst for strengthening the multi-lateral commitment to health as a vital public asset, and improving the institutional architecture being shaped by the lessons from across the globe in the first 16 months of the pandemic;
- **Multi-disciplinary Health and Economic leadership:** the need for leaders from traditionally separate and often siloed worlds of business, health and government to come together and frame genuinely integrated thinking on 'health economy': the structural relationship between health and economy, in both developed and developing nations, and the need for a new approach to resilience *by design* – recognising that health, economic and environmental resilience are linked;
- **Corporate leadership in cleaner and healthier growth:** the recognition that any serious effort to harness COVID-19 as a catalyst for healthier growth will require a framework of policies and incentives that helps corporate business leaders – of both global multinational and innovative new entrants – better play their part in leading, shaping and developing healthier growth.

Commission Objectives

The Commission has been convened to bring together internationally respected leaders from global business, health and public policy committed to improving Health Resilience, and help frame practical reforms for ensuring economic growth delivers improved health economic resilience and population health for all.

We are set up to do this in three principal ways:

1. **Shaping the 2021 Policy 'Reset':** supporting the G7, G20, OECD, WHO and helping national governments learn the right lessons from COVID-19 to inform better post-pandemic policy.
2. **Establishing a global academic network in Health Economic Resilience:** bringing together global academic leaders in public and population health and health economics to help develop an improved set of metrics, indices and models for policymakers to better support health economic resilience.
3. **Corporate leadership in Healthier Growth:** working with corporate leaders – by sector, geography and individual company – to help develop the right policies to support and accelerate corporate commitment and delivery of healthier growth.

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To this end the Reform for Resilience Commission is working to:

- Establish our Regional Hubs to:
 - Convene corporate and government leaders across the key global geographies.
 - Establish geographically specific clusters for shaping practical improvement in health economic resilience to suit different economic geographies.
- Establish our global research collaboration to:
 - Identify key drivers of 'Health Resilience'.
 - Make specific policy recommendations to enhance the institutional commitment to global Health Resilience as key to what could be termed 'healthier growth'.
 - Develop a Health Resilience model and index to help drive cultural and policy change.

Commission Structure

The structure of the Commission project reflects our mission and short- and long-term goals. The Commission project has five core components:

- **The Co-Chairs and Commissioners:** to provide the necessary personal multi-disciplinary leadership and advocacy support.
- **The Secretariat:** to initiate, convene, lead and coordinate the international network.
 - Intellectual development of evidence-based Health Resilience metrics
 - Geopolitical advocacy
 - Communications
 - Fundraising
- **The Regional Hubs:** to provide a forum for leaders from government, business and academia in the key global economic zones to discuss policy recommendations and influence the global discussion.
 - **Asia-Pacific**
 - **Europe**
 - **South Asia**
 - **North America**
- **Our Research Partners:** a network of global centres of excellence across the relevant disciplines required to develop a robust health-economic model of Health Resilience.
- **Our Corporate Partners:** major global businesses on the frontline of the global economy to provide a broad spread of funding and the necessary cross-sector insight.

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The Commissioners

Co-Chairs

- **His Excellency José Manuel Barroso.** Chairman, Goldman Sachs International; President of the European Commission (2004-14); Chair of Gavi, the Vaccine Alliance.
- **The Honorable Malcolm Turnbull.** 29th Prime Minister of Australia (2015-18).
- **Prof Michelle A. Williams.** Dean of Harvard TH Chan School for Public Health.

Convenor

- **George Freeman MP - Convenor** - UK Minister for Life Science (2014-16).

Commissioners

- **Prof Sir John Bell** - Regius Professor of Medicine, Oxford University.
- **The Honorable Dr. Chen Chien-jen** - Distinguished Professor at the Genomics Research Center at Academia Sinica; 14th Vice President of the Republic of China (Taiwan) (2016-20).
- **Dr Sumbul Desai** - Vice President, Apple Health.
- **Prof Lord Ara Darzi** - Co-Director of the Institute of Global Health Innovation, Imperial College London
- **Lord William Hague** - UK Foreign Secretary (2010-14).
- **Ms Connie Hedegaard** - European Commissioner for Climate Action (2010-14).
- **Prof David Heymann** - Professor of Infectious Disease Epidemiology at LSHTM.
- **Mr Leif Johansson** - Chairman, AstraZeneca.
- **Ms Roula Khalaf** - Editor of The Financial Times.
- **Prof Sharon Lewin** - Director, The Peter Doherty Institute for Infection and Immunity.
- **Ms Marcella Panucci** - Director General of Confindustria (2012-20).
- **Prof Ramesh Raskar** - Associate Professor at MIT Media Lab.
- **Mr Stan Shih** – Founder and Honorary Chairman, Acer Inc; Chairman, StanShih Foundation.
- **The Honorable Alexander Stubb** - Director of the School of Transnational Governance; Prime Minister of Finland (2014-15).

Regional Hubs

The Commission Regional Hubs are key to ensuring the practical, implementable and economic relevance and applicability of the Health Resilience concept in different parts of the world.

The Hubs provide local leadership for engaging with government, business and academia:

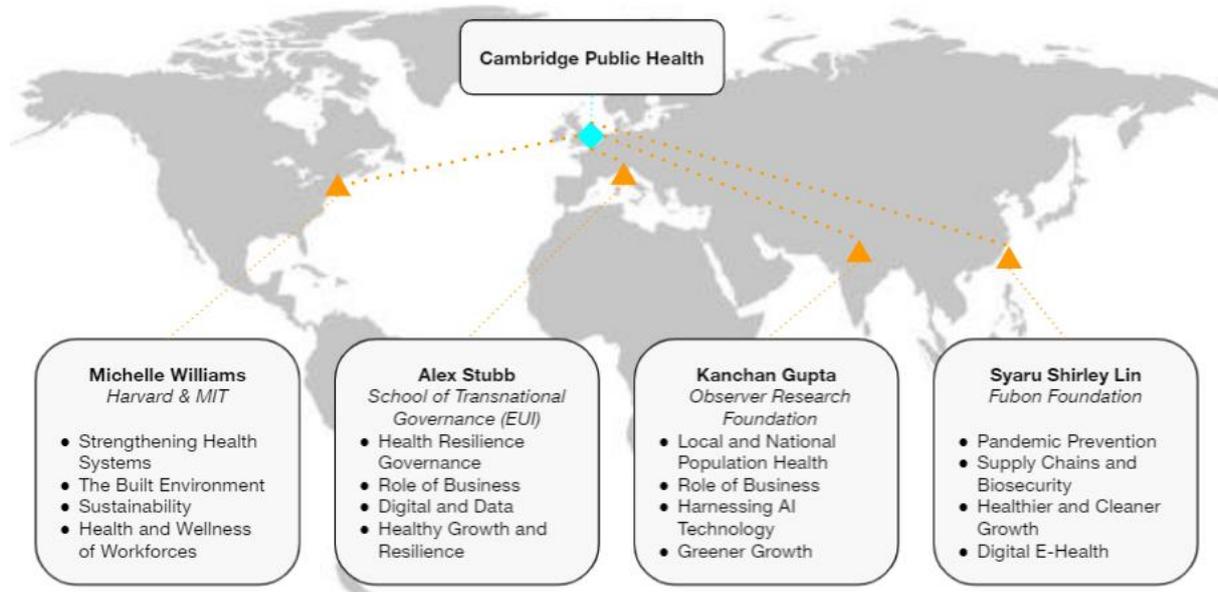
- **Convening:** bringing together the key people and institutions in the region.
- **Partnering:** creating and building the key regional partnerships between academic research, corporate leadership and governments.
- **Funding:** raising funds from local and regional companies.

In 2021 the Commission is establishing four Regional Hubs at different locations across the globe:

- **[Asia-Pacific:](#)** The Fubon Foundation
- **[Europe:](#)** The School of Transnational Governance (EUI)
- **[South Asia:](#)** The Observer Research Foundation
- **[North America:](#)** Harvard University & MIT

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Asia-Pacific Hub

The Asia-Pacific Hub is being hosted by the Fubon Foundation. The Hub is chaired by Prof. Syaru Shirley Lin of Chinese University of Hong Kong and University of Virginia, with John Tzuchiang Li of the Fubon Group as the Executive Director, Daniel Tsai of the Fubon Group as the Chair of the Steering Committee and Prof. Chang-Chuan Chan of National Taiwan University as the Chair of the Advisory Board.

The Asia-Pacific Hub is focusing its research on the following topics:

1. Pandemic Preparedness and Prevention: how well have individual countries prepared for past and future pandemics?
2. Global Supply Chains: how have governments and the private sector responded to disruption and changes in global supply chains caused by the pandemic?
3. Climate Change and the need for Healthier and Cleaner Growth: how is environmental health and sustainable development an integral part of public health and economic resilience?
4. Digital E-Health, Data, Informatics and AI: how can data, digital tools and AI be utilized to prevent, contain or manage pandemics?

Europe Hub

The Europe Hub is being hosted by the School of Transnational Governance at the European University Institute. The Hub is being convened by Alexander Stubb with Diane Stone as the Research Director and Jonas Brendebach as Hub Director.

The Europe Hub is focusing its research on the following topics:

1. Future Health Resilience Governance and Policy: Global and European Institutions, Strategy and Investments.
2. Population Health: differential population susceptibility + impact of COVID-19 across Europe.
3. Role of Business: startups and multinationals.
4. Digital and Data: shared data, infodemics and misinformation.
5. Healthy Growth and Resilience: measurement, metrics and indicators.

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South Asia Hub

The South Asia Hub is being hosted by the Observer Research Foundation. The Hub is being convened by Kanchan Gupta with Oommen Kurian as the Research Director. The South Asia Hub is focusing its research on the following topics:

1. Building population health at a local and national scale
2. The role of business in population health
3. Harnessing AI technology to build Health Resilience
4. Encouraging cleaner, 'greener' growth

North America Hub

The North America Hub is being co-hosted by Harvard University and MIT. The Hub is being convened by Prof Michelle A. Williams with a leadership team being appointed in June.

The North America Hub is focusing its research on the following topics:

1. Strengthening Health Systems: moving healthcare provision into the workforce and community.
2. The Built Environment: how buildings and the constructed environment can impact workforce health.
3. Sustainability: how to create carbon neutral environments at a local, national and international scale.
4. Health and Wellness of Workforces: what drives workforce physical health and mental wellness.

Africa and South America

In 2022 the Commission plans to establish Regional Hubs in Africa and South America.

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The Secretariat

The Commission Secretariat is hosted by Cambridge University, within Cambridge Public Health. The Secretariat is the central coordinating body of the Commission, responsible for the legal, financial and organisational integrity of the Commission. Its role is to:

- Coordinate the project to achieve the Commission deliverables and outputs.
- Liaise with Regional Hubs and Research Partners to supervise the research and evidence gathering.
- Collate research, write up reports and submit Policy Proposals to the Commissioners.
- Coordinate the Commission advocacy work.
- Oversee all finances and fundraising.
- Coordinate Commission events.

Cambridge Public Health

As a global federation of parties committed to Health Economic Resilience, the Commission is led at a global level by the Secretariat, and at each Hub level by Hub Directors, Researchers and corporate Partners.

The global Secretariat is based at Cambridge Public Health (CPH) at the University of Cambridge.

Cambridge Public Health (CPH) is the new Interdisciplinary Research Centre established to build on the successes of both the Cambridge Institute of Public Health and the Public Health Cambridge network, and extend out to the wider University to generate a powerful response to address global challenges to population health and wellbeing.

Through its research, capacity building and impact work and multidisciplinary approach, Cambridge Public Health will integrate key dimensions of vital importance to population health now and into the future, including physical, environmental, social, digital, legal and historical elements and many more essential to developing the evidence that will realise the improvement of society's health and wellbeing, our ecosystems and the planet.

Cambridge Public Health also hosts the Cambridge Research Hub associated with the Commission that is focused on development of the concept and testing of frameworks and the interfaces of economy, environment and population health working closely with the Regional Hubs.

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Global Research Partners and Advisory Board

The establishment and research work of the Commission has been supported by a global network of research organizations who have provided vital insight, evidence, signposting, networking and in many cases significant policy evidence submissions in helping us shape our thinking. Whilst the Analysis, Findings and in due course Recommendations of the Commissioners are the responsibility of the Commissioners and Secretariat alone, we are deeply grateful to all our research partners for their support and expertise.



Partner Acknowledgements and Disclaimer

This project could not have been put together without the pro-active support and engagement of all our global partners over the last 9 months. In response to our Call for Evidence, we received 23 academic submissions from Institutes around the world.

Our interim Research Report prepared by Dr. Anneke Schneider – published with this Progress Report – summarises:

- The evidence submitted by our academic Partners
- The work being done by the team at Cambridge Public Health to help frame a new model of Health Resilience by design, based on understanding the interconnected relationships between health, economy and environment.

The Recommendations and Key Findings in this Progress Report have been shaped and presented here by our sixteen Commissioners and three Co-Chairs in a personal capacity as advice to policymakers gathering for the G7 to tackle the ongoing emergency of the COVID-19 pandemic.

Key Findings and Recommendations

Through the work we and our Commissioners have done in the last 9 months we have identified a number of Key Lessons from the first 16 months of the pandemic which we suggest are key to helping shape the post-COVID-19 policy reset. Some are well evidenced and described in detail in the Research Report. Others are insights from our global network which we intend to work on and develop towards our Final Report.

In this next section we set out:

- **Our Key Findings**
- **Our Specific Recommendations**

Lessons from the global pandemic: Nov 2019 - June 2021

1. COVID-19 has revealed major systemic variations in health system resilience
2. The importance of real pandemic preparedness
3. The value of speed of response and the long-term impact of lockdown trajectories
4. The importance of reliable surveillance, testing and genomic data and data sharing protocols
5. The importance of public trust and compliance
6. The importance of frontline hygiene, aerosol control, facemasks and quarantining
7. The importance of population health
8. The importance of the global life science sector
9. The need for effective global collaboration for vaccine supply chains, distribution and roll-out
10. The need for a stronger global health resilience governance and policy architecture
11. The importance of global Private / Public Partnerships

Strengthening Health and Economic Resilience: A New Approach

12. The impact of place and the built environment
13. The dangers of systemic neglect of health economics
14. The importance of better measuring the real cost of disease and the value of health
15. The role of different models of growth on health and economic resilience

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16. The growing importance of Biosecurity
17. The need for a new approach to Health Economic Resilience
18. The difference between health resilience by design and intervention
19. The integration of healthier, cleaner and more sustainable growth
20. The key role of cities, business and corporate leadership in delivering change

New Metrics For New Partnerships In A New Ecosystem

21. The need for clearer metrics and models to monitor and manage Health Resilience
22. The key role of the private sector and public-private partnerships
23. Business leadership in delivering healthier growth
24. The need for a new Health Resilience Index

Urgent Recommendations

The Reform for Resilience Commission is making a number of Recommendations in three key areas:

- A.** Prioritization of global distribution of COVID-19 vaccine doses.
- B.** Prioritization of developing and sustaining multilateral engagement in global disease surveillance architecture to identify and contain new and reemerging disease threats.
- C.** Commitment to rebuilding economic, health and social systems that are resilient, equitable and environmentally sustainable.

A. Prioritization of global distribution of COVID-19 vaccine doses

No country is safe until every country is safe. With the Delta variant surging through large parts of the world, global leaders – in both the private and public sector – need to redouble their commitment to tackle the two most urgent problems today:

- Distribution and access to global vaccine supply. The world has billions of doses available. The urgent problem is distribution to ensure universal access.
- Vaccination uptake. Vaccination will only succeed in protecting global populations and unlocking global economic recovery if vaccination uptake is understood and addressed within countries.

Recommendation 1:

An end to export restrictions on both vaccines and vaccine components (often supplied from over 80 countries).

Recommendation 2:

Countries with surplus doses should provide the political leadership to develop consensus among their populations and political leaders to share vaccines with low and middle incomes countries without adequate supply.

Recommendation 3:

The world's wealthiest countries should provide the additional funding required to support the COVAX programme of universal vaccine access.

Recommendation 4:

A coordinated commitment to decentralise and diversify vaccine manufacturing to avoid the problems of over-concentration in a small number of countries, rendering global supply chains vulnerable.

Recommendation 5:

Aggressive measures combined with sensitive community approaches to counter anti-vax disinformation preventing the necessary uptake of vaccinations required to achieve effective global protection.

Recommendation 6:

Removal of barriers and creation of a clear and ethically sound framework of incentives for vaccine uptake: including generating evidence for the role of Vaccine Passporting and vaccine uptake for industries based on high density like tourism, airlines, hospitality and sports venues; and similar

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requirements for COVID-19 vaccination as countries like Australia already have for education and childcare.

B. Prioritization of developing and sustaining multilateral engagement in global disease surveillance infrastructure, workforce and programmatic activities to identify and contain new and reemerging disease threats

COVID-19 has revealed a serious systemic weakness in the lack of a proper framework, including strong ethics and governance, for adequate collection, curation and sharing of data on outbreaks across different parts of the world, which is not just a long-term issue to resolve – it is an urgent issue undermining our current ability to get the pandemic under control.

Recommendation 7:

The G7 should take urgent action on the establishment of global framework and infrastructure for data sharing that global society, from international to local, can see is appropriate, acceptable and sustained.

Recommendation 8:

Pandemic management requires shared data – for both epidemiological surveillance and vaccine R&D. The COG-UK platform for large scale rapid whole-genome sequencing of SARS-CoV-2 is excellent but not scalable. Similarly with national surveillance systems. We urge leaders of government and business to find a way to build on the existing GISAID and influenza surveillance architecture and Oracle solution via a global cloud, but with suitable data access and governance and ethical mechanisms to ensure use only by appropriate trusted global agencies for pandemic management.

C. Commit to rebuilding economic, health and social systems that are resilient, equitable and environmentally sustainable

COVID-19 is a wake-up call for the world's wealthiest nations to recognise COVID-19 has exposed serious systemic failures in the way we value health and needs to be a 'Bretton Woods' moment for global institutional commitment to health as a global public good, and the need for the OECD and G20 to support a new approach to health economic resilience by design.

Recommendation 9:

The wealthier nations of the world need to recognise COVID-19 is NOT a 'once in a 100 year' event. It is a warning sign after SARS, Ebola, Zika and other infectious disease outbreaks. It tells us that the pace and scale of globalisation and attendant tropical habitat destruction, unacceptable and persistent global inequalities and the huge migrations of people and species make the risk of phytosanitary and zoonotic disease a growing risk to both population health and economic resilience.

Recommendation 10:

The G7, G20, OECD and WHO need to strengthen their commitment to the concept of 'Health Economic Resilience' – recognising that healthier, cleaner, equitable and sustainable growth go hand-in-hand and that wealthier countries can no longer think that leaving this to the WHO is enough. Just as the Global Financial Crisis (GFC) led to the tightening up of the resilience of the global financial system, we now need a similar commitment to biosecurity and health economic risk resilience.

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Recommendation 11:

Health Economic Resilience is shaped by the daily lived reality of global business and growth: the practical realities of individuals within their neighbourhoods, the corporate workplace and workforce, the physical environment, phytosanitary and supply chain biosecurity. This is the practical interface of Economy, Environment and Health. We need a serious commitment to the OECD's 'Resilience by Design' approach with clear metrics and models to measure, monitor and manage health economic resilience and fiscal incentives to help leaders of companies (via integration of Health Resilience in ESG) and leaders in cities to start delivering healthier growth.

Lessons from the global pandemic: Nov 2019 - June 2021

1. COVID-19 has revealed major systemic variations in health system resilience

The SARS COVID-19 pandemic has represented an extraordinary test of the strength, adaptability and resilience of the global community, individual nations, cities and neighborhoods, families and individuals.

No country has managed a perfect response. Most have shown strengths and weaknesses:

- **Australia**, which was widely recognized as having delivered the most effective lockdown, is now struggling with effective quarantining and vaccine compliance.
- **Taiwan**, widely recognized as having been best prepared for the pandemic after its experience of the SARS virus – with strong digital disease surveillance, track and trace and public health infrastructure – had initially kept infections and death at extremely low levels, but is now suffering from a serious surge and a lack of vaccines.
- **Germany**, which managed to reduce mortality rates in the first wave because of prescient investment in additional ICU capacity, then struggled with the political consent and implementation of the autumn 2020 second wave lockdown.
- **The UK**, which was slow to lockdown and struggled with track and trace, has then led the world in the global race for vaccines as a result of its historic long-term investment in its innovative life science sector and specifically genomics and vaccine manufacturing.
- **France**, which as a world class health system, is struggling with serious vaccine non-compliance.
- **The United States** which had a chaotic response to the pandemic in 2020 and tragically high rates of infection and mortality, has now managed to achieve very high rates of vaccination.

But there are important – and sometimes uncomfortable - lessons for policymakers which it is imperative are learnt and applied in shaping both:

- The **urgent** immediate next stage of controlling the ‘3rd wave’ surge of the Delta variant now sweeping through South and East Asia. In this pandemic, no country is safe until every country is safe. Global leaders of the richest nations at the G7 and G20 need to act with urgency to tackle the problems of global vaccines roll-out.
- The vital longer-term lesson of COVID-19 as a wake-up call for serious strengthening of **institutional commitment to health and economic resilience**: recognizing that the pace of globalisation and climate change is increasing the risk of phytosanitary and respiratory disease outbreaks. Whilst the responsibility in the immediate crisis of the pandemic has been taken by states, ultimately the responsibility for compliance will fall on the individual, raising the importance of education in the role health and environment play in economic resilience.

2. The importance of real pandemic preparedness

Despite the spate of recent outbreaks of infectious disease epidemics in the last 20 years – from SARS to Ebola to Zika – the COVID-19 pandemic exposed a serious lack of pandemic preparedness at global, national and local levels.

The pandemic has highlighted the growing risks of infectious disease outbreaks and that we can no longer assume that pandemics like this are rare ‘one in a hundred year’ events. Just as climate change

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is requiring policymakers – and businesses – to change their modelling on ‘extreme’ weather events, so too with infectious disease.

Although some countries – typically those with experience of recent infectious disease outbreaks like SARS – were clearly better prepared than others, it is also true that as the pandemic has developed it has found weaknesses in every country’s systems. These lessons need to be learnt.

‘The four East Asian polities—Hong Kong, Korea, Taiwan, and Singapore—were able to take stringent actions early on because they had established an early warning system and put in place institutional infrastructure before the current virus outbreak. What prompted them to make such an investment? ... Hong Kong, Taiwan, and Singapore were among the hardest-hit polities by SARS in 2003. Although Korea suffered minimal damage from the same disease, the country became second to Saudi Arabia in terms of total MERS cases in 2015. Since then, all four polities overhauled their public health systems with a focus on preparing for the next round of epidemic¹.

Globally, the pandemic has exposed a chronic lack of global health policy architecture: from a lack of timely and reliable data collection and dissemination to a lack of architecture for ensuring that globalisation and global economic growth improve population health in all nations, to a lack of global governance for convening an international response at the necessary scale and speed required.

It is easy to criticize the WHO. But the reality is more nuanced. The GFC revealed a systemic lack of rigor in monitoring and managing the resilience of the global financial system, leaving the entire global economy vulnerable to risks that had been generated in one or two countries but weakened the whole global economic order. So too has COVID-19 exposed the same vulnerabilities in our health resilience.

The lack of any serious global pandemic preparedness framework made the impact far worse for all. The difference between well prepared and poorly prepared did not just leave some countries much worse off: it made the global pandemic worse.

3. The value of speed of response and the long-term impact of lockdown trajectories

COVID-19 has demonstrated the importance of speed in the immediate response to controlling an infectious disease pandemic. The lack of proper information and data from China at the time of the initial outbreak meant precious time for other countries to prepare was lost.

The pace at which COVID-19 spread out from China in November 2019 and the pace at which different countries responded shines a light on the importance of identifying best practice we need to embed in our new framework for Pandemic Preparedness. The map of national response rates as the virus spread across the globe provides a vital key to future pandemic planning and management. Whilst there are many reasons for the differential overall impact, it is clear that speed was key: those countries that locked down quickest were most able to minimize economic damage and reopen most quickly.

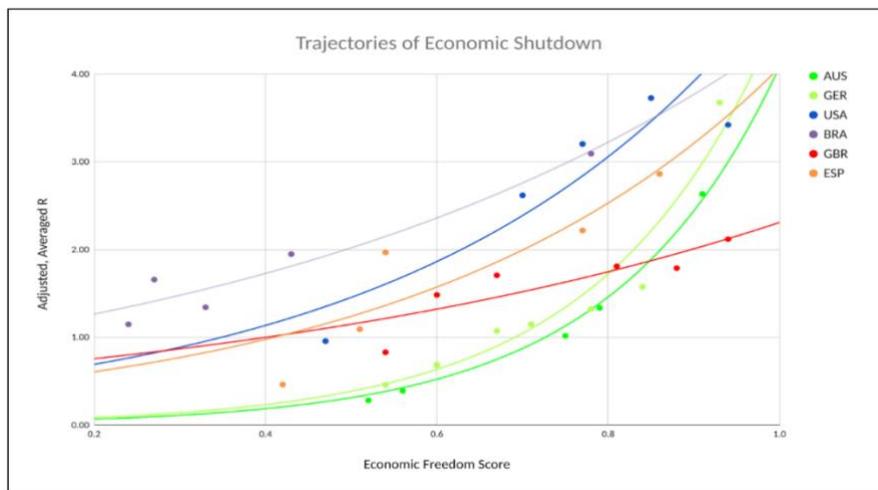
The crash of 2007 led to profound economic, social and political legacies. The economic impact of the COVID-19 pandemic will be both deeper and broader. The outcomes – successes and failures in driving recovery, reform and resilience across different economies and societies – look set to define the economic outlook in the coming decade. As part of our work, a team of Cambridge University academics and entrepreneurs collaborated with London-based Elgin Partners to create a dynamic new lockdown model to shine a light on the policy nexus between recovery and resurgence.

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The 'Economy versus Rate of infection Index' or 'EvRI' model developed in May 2020 by the Commission Secretariat with a team from Cambridge and Elgin Partners, the City-based risk advisory boutique, shone an interesting light on the success of different approaches to lockdown in the first wave, and, going forward, the policy responses most likely to be successful in unlocking economies. By identifying and assessing a basket of indicators of economic freedom, (E), including the extent of mandatory lockdown, access to public transport, freedom of movement, workplace closures and digital economic resilience (i.e., how much of an economy can continue digitally), the model highlights the trade-offs between R and E. From analysing the lockdown phase for the G20 nations, this first version of the EvRI model revealed:

- **Ranking:** a lockdown league table of G20 countries showing which have most successfully reduced R with least economic sacrifice.
- **Trajectory:** the different policy trajectories of G20 countries in imposing lockdown and reducing R.
- **Clustering:** which countries cluster together on a scatter graph showing the balance of different countries economic lockdown and infection control in the search for the 'sweet spot' of maximum economic freedom (E) with minimal rate of reproduction (R).



The EVRI Index model shone an important light on the degree to which lockdown is not quite the static linear mechanism it can seem: in a dynamic infectious disease control system the trajectory of lockdown has important secondary effects. Those countries – like Australia – which locked down earliest were able to settle at a higher rate of economic activity than countries like the UK which locked down later and thus had to impose harder, longer lockdowns when they did.

Unlocking economies with residual COVID-19 infections is not as simple as locking it down: one cannot simply 'reverse out' of the lockdown cul-de-sac. As policymakers in those countries with the lowest rates of infection and now looking to end lockdown are discovering, ending lockdowns will take a lot longer than imposing them.

There is some interesting emerging thinking on the longer term economic 'scarring' of the pandemic and the way in which a whole new set of structural econometric factors will determine an economy's ability to recover: including its resilience, extent of digitalisation and degree of urbanisation. Different structural socio-economic geographies are likely to shape recovery trajectories. We should forget one-size-fits-all policies and linear economic recoveries. As Satya Nadella said, the recovery we are going to experience will be 'more like a dial than a switch'. Driving sustained and resilient recovery will require a fundamental integration of econometric and health risk modelling. To find the R spot and unlock economies with minimum resurgence, policymakers need to better understand the relationship between Economic freedoms (E) and the rate of infection (R).

4. The importance of reliable surveillance, testing and genomic data and data sharing protocols

Pandemic management is all about data. From disease surveillance to epidemiological modelling, to track and test and genomic variation tracking and testing, the key to pandemic management is effective data sharing – between and within nations. COVID-19 has exposed a serious lack of properly integrated health data platforms at global, national and local levels.

From the lack of reliable early warning data from China, to the huge difference between those countries who could and couldn't successfully stand-up digital infection mapping and track and trace, to the lack of comparative data between different countries, to the absence of any global protocols or shared standards for pandemic informatics, COVID-19 has been a wake-up call for the importance of developing far more resilient platforms for global digital health.

COVID-19 has shown the huge potential of digital health technologies in accelerating the speed, accuracy and breadth of both pandemic surveillance, track and trace, diagnosis and treatment of disease, and the urgency of countries and global institutions developing reliable shared health data platforms which the public can trust.

Despite claims about 'big data' and the 'digital era', basic health data and surveillance systems can be seen as a patchy, underinvested infrastructure in many countries where data is needed to mostⁱⁱ. There have been deficiencies in data collection for death for some decades, with around two-thirds of deaths never registeredⁱⁱⁱ.

Just as for previous outbreaks, there were significant challenges in obtaining real-time data, and as such there were spectacular failures^{iv}. Beyond basic surveillance, there have been weaknesses in data production spanning statistics, public health, and research data challenges which have existed for some time^{v vi}. As a result, there have been errors and omissions in the way the data has been interpreted, despite COVID-19 being the first pandemic of the information age^{vii}.

There have also been gains in surveillance and data collection and use:

- Genomic sequencing, a health / data science initiative, contributed to the development of global knowledge about the virus and its variant^{viii ix x xi xii xiii}, informing public health response and underpinning life science initiatives including diagnostics and vaccine research and production^{xiv xv}.
- Digital health initiatives have scaled for pandemic response^{xvi}, offering significant value to both health and the economy across the pandemic^{xvii}. Telemedicine has emerged as a complementary digital initiative in many health systems, building on existing or emerging digital health foundations^{xviii xix xx}; and demonstrating the health system's capacity for large scale system change^{xxi}.
- Novel approaches to modelling and simulation leveraged emerging data sources and data analytics tools to conduct natural and other experiments^{xxii}. In some countries, analysts needed to develop novel methods and techniques to improve the decision-making and augment established epidemiological approaches^{xxiii xxiv}.

Stronger health systems had the institutional data infrastructure required for gathering, synthesising and interpreting evidence into technical advice, with data infrastructure therefore providing the foundation for both policy and clinical decision-making^{xxv}.

Spot the variant¹: Genomics for COVID-19 Surveillance

Variants have become the challenge of latest waves of the disease. That we know an increasing amount about SARS-CoV-2 and its variants is largely the result of extended use of genomics as a critical aspect of surveillance, and a means of underpinning drug and vaccine development.

- Countries such as the UK and South Africa established genomic surveillance early in the pandemic by setting up, respectively, the COVID-19 Genomics UK Consortium (COG-UK) and the Network for Genomic Surveillance in South Africa (NGS-SA) ¹. multi-agency consortiums established to share and collate genomic data.
- WHO released a guide to the use of genomic for surveillance in early 2021¹, noting:

'...the pandemic has opened great scientific opportunities and capitalized on them. A technological revolution, building over the past decade, provided several new capacities for a pandemic response... Sequencing enabled the world to rapidly identify SARS-CoV-2; and knowing the genome sequence allowed rapid development of diagnostic tests and other tools for the response. Continued genome sequencing supports the monitoring of the disease's spread and activity and evolution of the virus. ... This knowledge will shape a new vision of the world and open new paradigms in epidemic and pandemic prevention and control.

5. The importance of public trust and compliance

During pandemics, more so than any other time, people need accurate information^{xxvi}. From governments to households and companies, data is key. COVID-19 is the first pandemic of the information age; however there have been errors in the way that data has been interpreted, accompanied by the spread of 'extravagant disinformation'^{xxvii}, fueled by the pace and scale of social media as an alternative information system. Nowhere has fake news had more of a directly damaging impact than in undermining public trust and compliance with pandemic control measures: from attacks on the pandemic and lockdowns as a conspiracy by China against the West, to anti-vaccine disinformation campaigns. 2020 saw the creation of over 90,000 social media accounts with over 90 million followers committed to undermining public support for lockdown and vaccination.

Both disinformation and misinformation undermine efforts to develop and implement strategies to protect human health and life, with the serious risk that confusion and distrust can undermine an effective public health response, including vaccination hesitancy^{xxviii}.

COVID-19 also tested the actual effective authority and ability of different political systems to manage health crises. As different countries with different political systems embraced pandemic management policies, it is clear that the effectiveness of different interventions was shaped in no small way by the degree of political trust and compliance across different types of political systems.

This is not as simple as it seems. Whilst some might argue that more authoritarian regimes like China have been able to contain the spread of infection by enforcing strong internal lockdowns, and governments in liberal democracies like the USA and UK with a healthy commitment to individual freedoms were more cautious in locking down, it's also true that the global pandemic could have been stopped within and by China with better epidemiological surveillance data transparency and management, and that it is the European, US and UK life science sectors which have led the way in developing vaccines.

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6. The importance of frontline hygiene, aerosol control, facemasks and quarantining

The pandemic has forced many countries and cultures which have grown used to not having to worry about any serious risk of disease or death from communicable diseases to think again. Across the globe, governments, cities, transportation providers, companies and households have had to learn to take communicable disease hygiene very seriously. For many countries and cultures this has been a big culture change – and has exposed real weaknesses in hygiene infrastructure, the engineering of adequate ventilation and effective quarantining.

COVID-19 spreads mainly among people who are in close contact (within about 6 feet) for a prolonged period. Spread happens when an infected person coughs, sneezes, or talks, and droplets from their mouth or nose are launched into the air and land in the mouths or noses of people nearby. The droplets can also be inhaled into the lungs. Recent studies indicate that people who are infected but do not have symptoms likely also play a role in the spread of COVID-19. Since people can spread the virus before they know they are sick, public health bodies around the world are warning that it is important to stay at least 6 feet away from others when possible, even if you—or they—do not have any symptoms. Social distancing is especially important for people who are at higher risk for severe illness from COVID-19.

COVID-19 can live for hours or days on a surface, depending on factors such as sunlight, humidity, and the type of surface. A person can get COVID-19 by touching a surface or object that has the virus on it and then touching their own mouth, nose or eyes. However, this is not thought to be the main way the virus spreads. Social distancing helps limit opportunities to come in contact with contaminated surfaces and infected people outside the home.

It is clear that one of the big post- COVID-19 policy implications – for governments and companies and communities – is going to be the mainstreaming of both basic respiratory hygiene and the engineering of adequate ventilation across large swathes of our built environment.

The Commission is working with the Reckitt Global Hygiene Institute on the implications of this and how enhanced respiratory hygiene should sit within a post-pandemic model of health resilience.

Enforcement and compliance have been a major contributor to the success of countries in the Asia Pacific region controlling the first wave of the pandemic. Taiwan introduced \$10,000 fines for not wearing a mask in public and \$100,000 fines for spreading fake news.

7. The importance of population health

The differential impact of COVID-19 on different communities within the same country and health system has revealed the importance of population health in increasing COVID-19 susceptibility – and thus national economic impact of the virus.

As a disease of the respiratory system, COVID-19 has hit people with pre-existing cardio-pulmonary conditions especially hard: the data suggests that obesity and pre-existing cardio-metabolic conditions are the single biggest pre-determinant of infection and mortality.

As recent research published in the Lancet^{xxix} has shown, the risk of severe COVID-19 if an individual becomes infected is known to be higher in older individuals and those with underlying health conditions. Understanding the number of individuals at increased risk of severe COVID-19 and how

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this varies between countries should inform the design of possible strategies to shield or vaccinate those at highest risk.

The Lancet team estimated the number of individuals at increased risk of severe disease (defined as those with at least one condition listed as ‘at increased risk of severe COVID-19’ in current guidelines) by age (5-year age groups), sex and country for 188 countries using prevalence data from the Global Burden of Diseases, Injuries and Risk Factors Study (GBD) 2017 and UN population estimates for 2020. The list of underlying conditions relevant to COVID-19 was determined by mapping the conditions listed in GBD 2017 to those listed in guidelines published by WHO and public health agencies in the UK and the USA.

They analysed data from two large multimorbidity studies to determine appropriate adjustment factors for clustering and multimorbidity, and to help interpretation of the degree of risk among those at increased risk.

They estimate that:

- 1.7 billion (UI 1.0–2.4) people, comprising 22% (UI 15–28) of the global population, have at least one underlying condition that puts them at increased risk of severe COVID-19 if infected (ranging from <5% of those younger than 20 years to >66% of those aged 70 years or older)
- 349 million (186–787) people (4% [3–9] of the global population) are at high risk of severe COVID-19 and would require hospital admission if infected (ranging from <1% of those younger than 20 years to approximately 20% of those aged 70 years or older).
- 6% (3–12) of males to be at high risk compared with 3% (2–7) of females.

The share of the population at increased risk was highest in countries with older populations, African countries with high HIV/AIDS prevalence and small island nations with high diabetes prevalence. Estimates of the number of individuals at increased risk were most sensitive to the prevalence of chronic kidney disease, diabetes, cardiovascular disease and chronic respiratory disease.

COVID-19 has been a traumatic reminder that governments – and cities, industries, companies, communities, families and individuals – neglect population health at their peril.

COVID-19 has revealed the real cost of disease, and the real value of health. We are recommending that it be a catalyst for the overdue shift in health policy towards population health, prevention of disease – especially the obesity-related cardio-metabolic and respiratory chronic disease syndromes which have been such a key factor in COVID-19 mortality rates.

8. The importance of the global life science sector

From health data and disease tracing to testing to gene sequencing to vaccine manufacturing and much else, COVID-19 has been a global proving ground for a range of new technologies and of the importance of the life science sector and health technology in shaping health economic resilience. Technological sophistication has worked in numerous ways – from countries with widely available and reliable internet being less dependent on large scale daily commuting, to countries with sophisticated disease track and tracing systems as a legacy from SARS, to the UK’s leadership in genomics.

Whilst the pandemic has highlighted the importance of health technology to global economic resilience, the need for better integrated platforms of data surveillance and epidemiological informatics, it has also shown the importance of national capacity – especially in vaccine production

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and roll-out – and is likely to lead to many countries looking to invest in their national life science capabilities.

As crises usually are, the pandemic has been a major spur to global life science innovation in some crucial areas:

- **Track and Trace:** the success of countries in Asia Pacific, with pre-existing sophisticated systems for disease surveillance as a legacy of SARS, contrasts with the lack of integrated digital capacity for disease surveillance in other countries.
- **Diagnostic Testing:** the pandemic has driven huge research into the R&D of novel ways of doing rapid testing to support the ability of schools, theatres, sports venues and businesses and economies to return to work.
- **Genomic Sequencing:** the pace and sophistication of genomic sequencing capability in countries and companies which have prioritised this key sector has been a striking feature of the pandemic. Specifically, the UK investment in genomics via its groundbreaking Life Science Industrial Strategy in 2010-15 paid dividends – for the UK and for the world.
- **Vaccine Trials:** The scale, pace and success of the RECOVERY Trial – the most successful clinical trial in the history of medicine (recruiting 40% more patients more quickly than the next two trials combined) has been a showcase of the extraordinary catalyst COVID-19 has been for developing clinical trials protocols.
- **Vaccine Production:** The scale and pace of vaccine regulatory approval, production and roll-out within less than a year of the outbreak being reported by China has been a phenomenal global triumph for global life science.

The development of vaccines within one year of the onset of the pandemic, as noted earlier, is nothing short of remarkable. The global response has also been innovative, with the University of Oxford-AstraZeneca partnership producing a vaccine with the potential to reach billions as a public good through the new COVAX Facility and enabling greater and more equitable access to vaccines for low- and middle- income countries^{xxx}. Vaccine manufacturing and production, however, has been challenging, for many reasons. The issue now is the roll-out of vaccine manufacturing capacity globally, on which COVAX and GAVI are rightly focused.

Investment in advanced life science capabilities has paid dividends for both investing countries and the globe. Whilst it is understandable that COVID-19 might lead countries to seek to have their own vaccine manufacturing capability to help bolster their resilience for future pandemics, it is not practicable or financially sustainable to build a vaccine factory in each country. We need a global architecture for better coordinated vaccine manufacture and roll-out.

The pandemic has also been a reminder of the importance of the work being led by a number of new life science and health technology companies to evolve away from the old paradigm of relying on late-stage treatment of disease, to a new paradigm of place and **population-based approaches to health reimbursement** based on reducing the cost of disease in a specific population or location.

The pace of technological developments in digital health, diagnosis, remote sensing, informatics, genomic and phenotypic profiling and ‘smart’ healthtech heralds a new Life Science 2.0 ecosystem. We need people to think differently about the problem and embrace new models of reimbursement for earlier intervention and rewards for reducing the cost of disease. This will require place and population-based partnerships of companies across the medtech spectrum such as those being pioneered by companies like Apple Health, Medtronic, Fitbit and other wearable and consumer digital health innovators with companies like Novo and AZ. These partnerships are actively exploring

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new approaches to prevention and ‘Value Based’ reimbursement for health rather than disease treatment, and are working with cities and regions to reduce the crippling cost of chronic disease.

9. The need for effective global collaboration for vaccine supply chains, distribution and roll-out

Despite the spectacular progress with the development, testing and successful roll-out in a number of countries of effective COVID-19 vaccines, the effective use of those vaccines globally to help protect people around the world from the pandemic and reduce the rate of viral reproduction, which drives the emergence of new variants, is an urgent global crisis. A combination of problems with vaccine manufacturing, delivery and distribution to populations in countries with inadequate health infrastructure risk this global pandemic continuing to spread out of control. As we highlight in our Recommendations, we need a much stronger focus on global supply chains and stronger public-private partnerships for effective global distribution and ensuring appropriate global distribution and resilient manufacturing capacity.

Rapid deployment of effective vaccines is now the single most urgent requirement for a safe and healthy post- COVID-19 world. Of most urgency is the global redistribution and roll-out of vaccines.

Vaccine Hesitancy

There is an urgent need to address the problem of ‘vaccine hesitancy’ as a challenge which will affect future resilience and undermine significant public and private investments in countering the impact of COVID-19, with an estimated 30% of people indicating they may refuse COVID-19 vaccines^{xxxv}.

- Vaccine hesitancy is a public health threat, has taken a toll on immunization programmes around the world and is a major barrier to achieving global vaccination goals^{xxxii}. Hesitancy, especially that brought about by misinformation and disinformation, will undermine efforts to develop and implement strategies to protect human health and life, with the serious risk that confusion and distrust can undermine an effective public health response^{xxxiii}.
- Beyond this, however, vaccine hesitancy has the capacity to undermine resilience across multiple systems. When confidence in medical interventions is reduced, this in turn affects other systems, such as the broader economic systems.
- Vaccine hesitancy can be caused by a range of factors, including lack of trust and information, politicization, misinformation and disinformation^{xxxiv}. These concerns have needed to be addressed across the course of the pandemic by governments and have been confounded by the online disinformation with profound implications for public health^{xxxv}, requiring significant attention by platforms such as Google and Facebook.

According to the Lancet Commission on COVID-19 Vaccines and Therapeutics:

‘...It is imperative that government leaders prioritize evidence-driven communication strategies in their Covid19 vaccine programs, while healthcare providers maintain situational awareness, respond to public concerns, and counter unfounded claims by those seeking to undermine public confidence in vaccines^{xxxvi}.

10. The need for a stronger global health resilience governance and policy architecture

COVID-19 has been a global test of the appropriate scales of intervention: international, national, sub-national, local and sectoral. Transnational and international cooperation have been ongoing challenges during the pandemic. Despite International Health Regulations and years of discussion about pandemic preparedness, there has been an evident lack of insight into how to cooperate in the face of a pandemic, and how to coordinate across country borders.

Global Governance

It is beyond doubt that COVID-19 has exposed a serious lack of integrated global institutional commitment to health and economic resilience. Through GAVI and COVAX and a number of bilateral arrangements, global leaders have moved fast to tackle the key immediate issues of Vaccine Roll-Out and Pandemic Preparedness, but the pandemic has highlighted the serious need for a global architecture for both pandemic preparedness and a strong global commitment to health and economic resilience.

If we are going to make COVID-19 a catalyst for a properly integrated approach to Health Economic Resilience, then there will need to be an architecture for bringing together the WHO, OECD, IMF, G20, B20 and global business leadership to develop that framework.

Our global Research submissions have highlighted that transnational and international cooperation between states have been ongoing challenges during the pandemic, with governance and cooperation was frustrated by governments closing their borders to adjacent countries or being accused of taking actions which ‘beggar thy neighbour.’^{xxxvii}

- Cooperation opportunities were therefore missed. For example, ASEAN countries delivered relief packages independently; coordination of approaches at an earlier stage could have lowered overall costs and resulted in targeted mitigation within and across countries^{xxxviii}.
- As Hanspach notes, the pandemic also revealed opportunities in Europe to strengthen transnational market integration in Europe for medical supplies^{xxxix}.
- In some regions, transnational governance has helped to develop cooperative and integrated approaches to health security beyond borders^{xl xli}. For example, Taiwan, through private-public collaboration, provided PPE to many countries during the pandemic^{xlii}.

However, there is also opportunity for evolution in the understanding of governance, especially as it relates to future resilience.

- There is an increasingly pluralistic perspective on transnational governance. In an era characterized by ailing multilateralism, there is reliance on non-state actors not only for their expertise, financing and inputs to policy delivery but also in their contributions to the design and legitimation of new tools of transnational governance, including helping develop and monitor the metrics of progress, for instance, towards the SDGs.
- New modes of transnational governance have emerged in response to ‘multiplexity’^{xliiii}: the great *complexity* of global challenges of health, environment and other transboundary policy problems. As a result, the leadership of bodies like the G20 or OECD in responding to global challenges is gradually being shared with *multiple* non-state actors.
- While states remain the central and crucial decision-making actors in a multiplex world, governance innovations like transnational public-private partnerships, private regulatory regimes and standard setters (e.g. the Marine Stewardship Council or the ISEAL Alliance), peak association bodies like the B20 orbiting the Group of 20 processes or large scale philanthropic initiative are also important^{xliiv}. During the pandemic, such public-private partnerships have

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been a *modus operandi* for resilience^{xlv}, often reflecting prior, mature, relationships between government, academic and private sectors^{xlvi}, and mediating systems interactions and therefore resilience^{xlvii}. In countries such as Singapore, pre-existing public-private partnerships have been a key aspect of its response^{xlviii}.

Public-Private Partnerships for Innovation in Surveillance: The Case of Taiwan CDC and Acer Inc.

The Taiwan Center for Disease Control (CDC) partnered with Acer e-Enabling Service Business (AEB) to create a surveillance system for real-time analyses and reporting. Implemented in December 2019, the surveillance system has since proven important in monitoring COVID-19 in Taiwan. The surveillance system enables collaboration between multiple health system actors including medical units, hospitals, and governmental departments, with specific focus on:

- The accuracy of data to save lives. The platform includes readily available information about cases to formulate the containment, prevention policies, and strategic measure, as well as epidemiological trends about infections.
- The use of treatments for better understanding about efficacy and resistance.
- Built in data protection and confidentiality. The platform is also compatible with the National Health Insurance (NHI) system^{xlix}.

National Governance

Whilst COVID-19 as a global pandemic has been a shock to the global health economy and has been a sharp reminder to all national governments of the inter-connectedness of the globalised economy, it has also exposed particular issues and challenges in particular countries: from the increased vulnerability arising from weaknesses in population health where obesity and pre-existing cardio-metabolic-respiratory disease have led to an increased mortality, to the lack of adequate digital epidemiological platforms for track and trace and data sharing to the difficulties of establishing the right basis for national and local decision making.

As ever, the most prosperous and advanced nations will need to give a lead. Each G20 government will want to learn lessons and review what reforms it should put in place.

Just as the GFC led to a number of reforms globally led by the OECD, IMF and G20, and in countries like the UK hard hit by the GFC reforms such as the creation of the independent Office for Budget Responsibility (OBR) which publishes annual updates on the economic resilience of national finances, we suggest national governments will want to look at a combination of reforms to enhance the measurement, monitoring and management of health economic resilience.

Our model suggest governments may want to look specifically at the interfaces between Health, Economy and Environment – for example the role of Travel to Work commuting patterns, housing, health inequalities, obesity and the incidence of cardio-respiratory disease comorbidities.

Sub-National: Cities and Mayors

One of the most interesting implications of our early model development work is the importance of Cities and Mayors in shaping many of the key policies shaping health and economic resilience on the interfaces of Health, Economy and Environment.

Our Asia-Pacific hub reports that in Taiwan local government has enjoyed a high degree of trust and, despite robust democratic debate, strong compliance with national protocols, with the public showing a good understanding of community health due to the experience of SARS. Furthermore, Taiwan's national health insurance smart card system allows for effective track and trace.

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But different countries require different approaches. In the coming months we plan to work with a number of Cities and Mayors across North America, Europe, India and Asia-Pacific to test and refine our model and help shape a framework for identifying and assessing different policy options for practical place-based approaches to enhancing health resilience, reflecting different local geographies.

11. The importance of global Private / Public Partnerships

Gavi, the Vaccine Alliance, was set up to help global vaccination of children in poorer countries against deadly and debilitating infectious diseases. It now helps almost half the world's children.

Gavi's impact draws on the strengths of its core partners, the World Health Organization, UNICEF, the World Bank and the Bill & Melinda Gates Foundation, and plays a critical role in strengthening primary health care (PHC), bringing the world closer to the Sustainable Development Goal (SDG) of Universal Health Coverage (UHC) and ensuring that no one is left behind. Gavi also works with donors, including sovereign governments, private sector foundations and corporate partners; NGOs, advocacy groups, professional and community associations, faith-based organisations and academia; vaccine manufacturers, including those in emerging markets; research and technical health institutes; and implementing country governments.

Gavi's Impact

- **More children survive.** The increase in immunisation has helped halve childhood mortality by preventing more than 14 million future deaths and dramatically driven down the incidence of deadly and debilitating infectious diseases.
- **Nation building thrives.** As children become healthier, they, their families, communities and countries are more able to be economically prosperous and socially stable. For every US\$ 1 spent on immunisation in Gavi-supported countries in the 2021–2030 period, US\$ 21 are saved in health care costs, lost wages and lost productivity due to illness and death. When considering the value people place on lives saved by vaccines – which is likely to include the value of costs averted plus the broader societal value of lives saved and people living longer and healthier lives – the return on investment is estimated to be US\$ 54 per US\$ 1 spent. In Gavi's first 17 years, it helped generate more than US\$ 150 billion in economic benefits in the countries supported.
- **And global health security improves.** In the face of global challenges, such as climate change, population growth, urbanisation, human migration, fragility and conflict, Gavi has helped countries broaden vaccine coverage and improve their health systems. This makes them less susceptible and better able to prevent disease outbreaks that pose a threat to people in these countries, protecting millions of others around the world.

Gavi has already protected an entire generation of children and is now working to protect the next generation. By improving access to new and under-used vaccines for millions of the most vulnerable children, the Vaccine Alliance is transforming the lives of individuals, helping to boost the economies of lower-income countries and making the world safer for everyone.

The current five-year strategy was approved by the Board in June 2014 – the full implementation of the strategy will see developing countries immunise 300 million children, saving 5–6 million lives in the long term. Coverage and equity are at the core of Gavi's current strategy. While continuing to support countries to introduce new vaccines, the focus is expanding to reach every child with these vaccines. With as many as 20 countries transitioning out of financial support in this period, ensuring that programmes are sustainable in the long term is essential.

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COVAX

COVAX is the vaccines pillar of the Access to COVID-19 Tools (ACT) Accelerator: a ground-breaking global collaboration to accelerate the development, production, and equitable access to COVID-19 tests, treatments, and vaccines. COVAX is co-led by the Coalition for Epidemic Preparedness Innovations (CEPI), Gavi and the World Health Organization (WHO), alongside key delivery partner UNICEF. Its aim is to accelerate the development and manufacture of COVID-19 vaccines, and to guarantee fair and equitable access for every country in the world.

COVAX has so far shipped over 76 million COVID-19 vaccines to 126 participants. It is the core global platform for tackling the need for universal global access to vaccines and highlights the vital role of public-private partnerships.

Strengthening Health And Economic Resilience: A New Approach

12. The impact of place and the working environment

As COVID-19 has swept the globe it has revealed in a powerful way the role of the built environment in health resilience. This ranges from the obvious fundamental susceptibility of high density, low-income communities to infectious disease to the role of poor housing in exacerbating respiratory disease and the role of different urban transportation systems in shaping the ability of an economy to recover without driving viral infection back up.

More work needs to be done on this but initial evidence from our Regional Hubs and research partners suggests a major role of different built environments. The data suggest disease susceptibility has differed markedly across different types of built environment: and not always in ways that might have been predicted. For example, whilst the high population density of New York might have been expected to give rise to a particularly high rate of COVID-19 susceptibility, data suggest that the reliance of most New Yorkers on the subway and buses for daily transportation led to a much higher degree of basic cardiorespiratory fitness than more car-dependent cities in the USA, which were hit harder.

At a global level, the pandemic raises real questions about the health economic sustainability of continuing the current model of globalisation based on high degrees of urbanisation, migration and commuting.

At local level, many cities, communities and companies are now seriously rethinking the assumptions they have made about the traditional pattern of Travel to Work, workplace and occupational health, commuting and remote working.

COVID-19 has obviously had a dramatic effect in accelerating pre-existing digital retail and other workplace changes with major impacts on future growth. Whilst some traditional retail businesses have gone bust, companies almost unheard of by many 12 months ago are now household names. Similarly, public and consumer attitudes appear to have shifted – perhaps irreversibly. It seems that many businesses are now reviewing traditional attitudes to the workplace, patterns of commuting and the value of workplace occupational health – physical and mental.

13. The dangers of systemic neglect of health economics

The pandemic required governments to make tough decisions about the right level of economic shutdown to control the virus spreading. Whilst initial decisions on the need for lockdown in spring 2020 quickly became globally accepted, decisions over how best to balance the economic damage with the wider health costs – in canceled operations, missed cancer diagnoses and the secondary knock-on side-effects of lockdown such as in mental health and rises in domestic abuse – were being made with little or no evidence on which to draw.

COVID-19 was a massive test of our commitment to health economics as a policy discipline. It exposed a systemic neglect of properly integrated health economics as a research science or policy discipline. The crisis exposed the danger of the traditional separation of health and economic policymaking, and a serious lack of attention, leadership, data and common protocols for managing a health economic crisis. Many governments found themselves having to take massive public policy decisions based on a serious lack of expertise in health economics: the relationship between health and economy.

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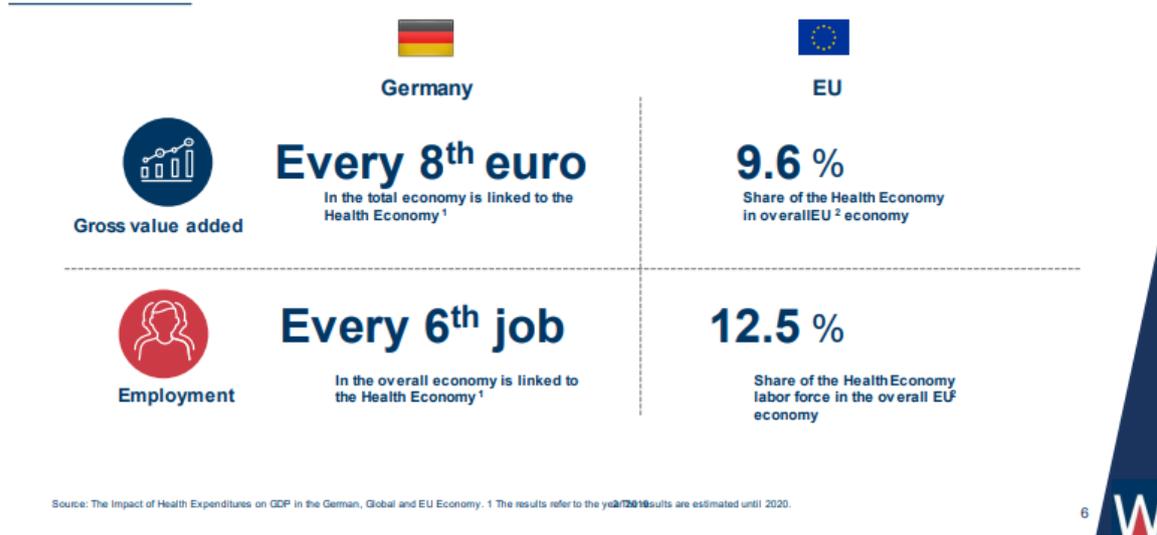
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As one Minister in the UK observed:

'We were being asked to make decisions with massive ramifications for lives and livelihoods on the basis of no serious health economic scientific disciplines. We have fantastic epidemiologists but almost no health economic professionals able to advise on the wider health and economic cost-benefits of major policy decisions. We have paid the price for reducing health economics to arcane questions such as "which is more valuable to the NHS – a syringe or a plaster?" – rather than the serious policy basis of managing a health economic emergency'.

Submissions received promoted the opportunity to reenvision macro-economic models to better integrate dynamic disease transmission modelsⁱ, invest in health systems as an essential infrastructure or asset and be invested in for resilience *by-design* and *by-intervention*. Better estimation of health and health-economy shares of GDP, for example, as well as labour force shares for health, can yield important observations for policy makers making investment decisions focused on resilience, as has been shown in the case of Germany and other countries (diagram below)ⁱⁱ.

Indicative Impacts of the Health Economy on the GDP of the German and European Economies (2020)



14. The importance of better measuring the real cost of disease and the value of health

COVID-19 has been a sharp reminder to global economic leaders that susceptibility to disease isn't just a health issue – it's an economic one. With huge short term costs from fiscal intervention, and longer term in terms of economic 'scarring'. COVID-19 has shown that we need a properly integrated basis for measuring, monitoring and managing the relationship between health and economic resilience in a population.

The total cost to the global economy – or national economies – is impossible to measure properly at this stage. However, it is clear that the immediate economic impact has been catastrophic for many of the richest countries and manageable for others (with potentially significant downstream implications for the global distribution of wealth and debt and thus the distribution of global capacity, and political appetite for, heavily affected wealthier countries to contribute to global aid) and with very different levels of economic scarring.

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As some countries like the UK begin to emerge from the immediate public health emergency and frame policies for a post- COVID-19 recovery, major questions are starting to be asked about the right way to deal with the COVID-19 debt legacy. In the UK, COVID-19 has cost the UK Exchequer c.£800billion in immediate relief (slightly more than the then unprecedented total rescue package for the UK banking system in 2008 of £700 billion). The new US administration has announced a \$3trillion COVID-19 relief package. These levels of debt are manageable as a once in a century event, but the rising occurrence of such events mean it is an unsustainable long-term option.

As the full economic cost of COVID-19 begins to be better understood, it is hoped that it will drive a much stronger appreciation of, and commitment to, the cost of disease, the importance of disease susceptibility to economic resilience, the value of health and the importance of better incentivising health promotion and disease prevention for economic as well as public health reasons.

If we are to harness COVID-19 as a catalyst for strengthening health economic resilience we will need to develop better frameworks for measuring the real full cost of disease – from pandemics like COVID-19 to longer term chronic disease comorbidities that are beginning to dominate the health economies of advanced prosperous nations.

To develop effective policy interventions, we will need new models for cost of disease and economic value of health at multiple scales: globally, nationally and sub-nationally by place so that integrated policies for preventing disease by earlier intervention can be put in place to support healthier growth.

15. The role of different models of growth on health and economic resilience

As it has swept across the globe COVID-19 has revealed some important disparities between the susceptibilities of different countries to the disease, and the role of different models of economic growth on infectious disease resilience: from the impact of Travel to Work patterns, diet, workplace health, the built environment, levels of digitalization and urbanization.

Countries like the UK and USA which have traditionally been viewed as having highly advanced health systems have discovered that longstanding structural population health weaknesses associated with prosperity: high incidence of obesity and cardio respiratory chronic disease, longstanding pockets of health inequalities linked to poor diet, smoking, and lack of exercise have significantly worsened the national economic impact of COVID-19.

As global leaders push the importance of ‘healthier and cleaner growth’ in light of the growing urgency of climate change growing, for this to be deliverable and meaningful and sustainable it will need some serious and rigorous policy interventions to create the incentives needed to harness market forces to deliver sustainable growth.

As global policymakers – in particular the vital work led by former Governor of the Bank of England and Chair of the Canadian Federal Reserve Mark Carney – look to establish frameworks for supporting the mainstream adoption of decarbonization via investable carbon finance metrics, we suggest an equally important piece of work in parallel is needed to mainstream Health Resilience as an investable asset, which would lay the foundations for new incentives to support the essential integration of changing consumer behaviours in diet, nutrition, exercise and the daily consumer routines which shape the health resilience of a population.

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Case Study: Estonia - The 'unremarkable' digital nation

The small Baltic country of Estonia has built one of the world's most advanced digital societies. When the coronavirus crisis struck, this investment paid off as Estonia's digital public services continued largely uninterrupted.ⁱⁱⁱ

In early March, Estonia declared a state of emergency, closed its borders and entered a full lockdown to stop the spread of COVID-19. But while other countries scrambled to deal with school closures and the disruption to vital services, Estonia simply continued to use the thriving, resilient digital infrastructure it had spent decades developing. Digital classrooms, online teaching materials and a huge range of online public services were already in place. Even more crucially, Estonians knew how to access and use them. Citizens embraced the digital revolution because it was transparent, fair and to the benefit of all.

Estonia built one of the world's most advanced digital society long before the COVID-19 pandemic, providing services such as electronic voting, online learning in schools, digital bureaucracy and healthcare.

During the lockdown, 99% of government services remained available online in Estonia. Online options already existed for everyday procedures such as registering businesses and properties and applying for social benefits. Certain benefits such as family benefits are even triggered automatically by events such as the birth of a child and its registration.

Estonia's digital resilience extends to higher education. When the world went into lockdown, the University of Tartu in Estonia switched to remote teaching in just one day, because all the digital technology and materials were already in place. In Estonia, 87% of schools were already using e-solutions before the crisis. Estonian teachers are trained in digital education and internet safety.

Digital health records and e-prescription services freed up Estonian doctors, nurses and administrators for the fight against the pandemic. Strong public-private partnership have facilitated contactless options in everyday life, including at border crossings.

Such seamless online services are possible because Estonia has pioneered the use of digital identity. Official decisions are confirmed with a digital stamp, and individuals can sign with digital signatures. These digital versions are equal to physical stamps or signatures under Estonian law.

16. The growing importance of Biosecurity

The pace of globalisation is clearly driving a growing likelihood of new infectious disease risks. Over the last decade alone we have seen SARS, Ebola, Zika and now COVID-19.

As a virus apparently originating from the wet markets of Wuhan, COVID-19 has been a sharp reminder of the growing importance of biosecurity and the risk of zoonotic diseases in an increasingly globalised economy. The pace of rainforest deforestation, scale of human migration and changing diets of fast developing economies is rapidly increasing the rate of biosecurity risks. As both a strategic global resilience factor and a daily workplace hygiene issue for employees in global supply chains and companies, biosecurity needs serious prioritisation at every level.

Biosecurity is both a serious problem for global economic health resilience and surveillance, and an increasingly serious and practical day to day issue for many businesses – especially those at the heart

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of integrated supply chains, and trading zones like the EU, Africa and Asia Pacific, which see huge volumes of trade cargoes moving between different nations and phytosanitary jurisdictions.

For many businesses, COVID-19 has seen supply chain biosecurity go from a conceptual strategic risk to a daily commercial imperative. For a restoration of a more health resilient growth post- COVID-19, Biosecurity will need to become as serious and contemporary an issue as cyber security.

17. The need for a new approach to Health Economic Resilience

Critique of the Global Health Security Index

The Global Health Security (GHS) Index is the first comprehensive assessment and benchmarking of health security and related capabilities across the 195 countries that make up the States Parties to the International Health Regulations (IHR [2005]). The GHS Index is a project of the Nuclear Threat Initiative (NTI) and the Johns Hopkins Center for Health Security (JHU) and was developed with The Economist Intelligence Unit (EIU) with the intention that, over time, the GHS Index will spur measurable changes in national health security and improve international capability to address one of the world's most omnipresent risks: infectious disease outbreaks that can lead to international epidemics and pandemics.

1. **Prevention:** Prevention of the emergence or release of pathogens
2. **Detection and Reporting:** Early detection and reporting for epidemics of potential international concern
3. **Rapid Response:** Rapid response to and mitigation of the spread of an epidemic
4. **Health System:** Sufficient and robust health system to treat the sick and protect health workers
5. **Compliance with International Norms:** Commitments to improving national capacity, financing plans to address gaps, and adhering to global norms
6. **Risk Environment:** Overall risk environment and country vulnerability to biological threats

Among its 140 questions, the GHS Index prioritizes not only countries' capacities, but also the existence of functional, tested, proven capabilities for stopping outbreaks at the source. Several questions in the GHS Index are designed to determine not only whether a capacity exists, but also whether that capacity is regularly—for example, annually—tested and shown to be functional in exercises or real-world events. The GHS Index also includes indicators of nations' capacities and capabilities to reduce Global Catastrophic Biological Risks (GCBRs), which are biological risks of unprecedented scale that could cause severe damage to human civilization at a global level, potentially undermining civilization's long-term potential. These are events that could wipe out gains in sustainable development and global health because of their potential to cause national and regional instability, global economic consequences and widespread morbidity and mortality.

As has been observed by many others, the HIS has not proved to be an accurate predictor of how different countries have actually fared under COVID-19:

"The ongoing Covid19 pandemic has devastated many countries with ripple effects felt in various sectors of the global economy. In November 2019, the Global Health Security (GHS) Index was released as the first detailed assessment and benchmarking of 195 countries to prevent, detect, and respond to infectious disease threats. This paper presents the first comparison of Organization for Economic Cooperation and Development OECD countries' performance during the pandemic, with the pre-Covid19 pandemic preparedness as determined by the GHS Index. Using a rank-based analysis, four indices were compared between select countries, including total cases, total

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deaths, recovery rate, and total tests performed, all standardized for comparison. Our findings suggest a discrepancy between the GHS index rating and the actual performance of countries during this pandemic, with an overestimation of the preparedness of some countries scoring highly on the GHS index and underestimation of the preparedness of other countries with relatively lower scores on the GHS index^{liii}.

The Commission believes that, for future resilience and healthy growth, the fundamental relationship between health, environment and economy must be reconceptualised. This must include greater attention to innovation, and an ambitious integration of policies, models and metrics at local, national and global levels, as well as in the corporate world. In its Call for Evidence, the Commission sought expert advice and insights on the development of a broader definition of resilience which placed ‘health resilience’ within a system context and synthesised and integrated systems evidence from before and during the current pandemic to identify interrelationships between systems.

Research and evidence provided to the Commission has revealed that current definitions of the term ‘resilience’ are at odds with pandemic experience.

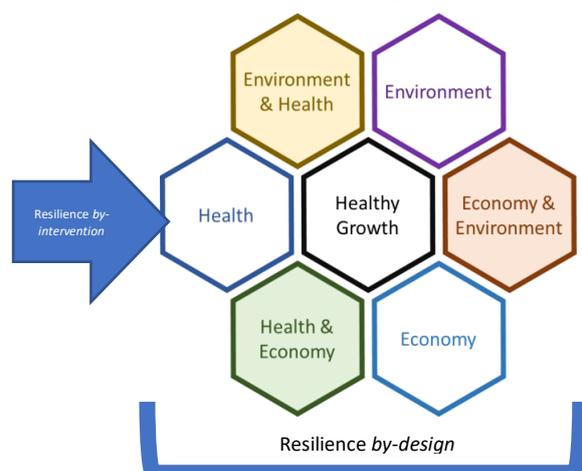
- Current definitions for health resilience focus on the capacity of health systems to forecast shocks and absorb, adapt, anticipate and transform when exposed to external threats in order to retain control over the primary objectives and functions of the health system^{liv} ^{iv}.
- Traditional economic definitions of resilience similarly focus narrowly on the economic impact of shocks^{lvi}, with analysis leaving aside important non-economic dimensions like health and human impacts^{lvii}. Analysis and consequent policy have focused on trade-offs between sectors - economy/health or economy/environment - despite evidence that goals in these sectors could be achieved together^{lviii}.
- Finally, definitions focus on interventions needed during or after shocks^{lix}, rather than how foundations are designed in order that they can be resilient in an ongoing manner ^{lx} ^{lxi}.

18. The difference between health resilience by design and intervention

Resilient systems require secure foundations, the ability to understand the current state of play and to plan, as well as the capacity to rapidly adapt and transform^{lxii}. However, discussion about resilience often focuses on the immediate response to the shock, rather than the foundations and underpinnings required for response.

OECD New Approaches to Economic Challenges provided a submission which beneficially categorises resilience into two related dimensions: resilience *by-design* and *by-intervention* (diagram below).

- Resilience-by-intervention presumes that an external resource will be available as needed to support system resilience in the event of shock. In the case of COVID-19, this shock occurred in health.
- However, resilience-by-design builds the capacity for a system to recover critical functions after a disruption within the structure of the system; for example, the mobilisation of life sciences capacities and the expansion of telehealth during the coronavirus pandemic, which built on prior investments.^{lxiii}



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The framework was further developed for this report by the OECD authors and the Commission to highlight how these concepts can be used to present a policy framework for resilience (box over page). Further development of this work to support the Cambridge Resilience Model will be taken forward for the Commission's final report.

With a strong focus on vaccine development and distribution as an urgent intervention for resilience, it is easy to overlook other activities which have contributed to resilient responses to date during the pandemic. For both current and future resilience, submissions and research identified the need to build on, and quantify the value of, both the gains *and* lessons in health and economic innovation^{lxiv lxxv lxxvi lxxvii}.

Despite, or perhaps because of, the continuing waves of COVID-19, a range of innovations have emerged^{lxviii lxxix} at the 'extended area' beyond health systems^{lxx}. For example:

- Genomic sequencing, a health / data science initiative, contributed to development of global knowledge about the virus and its variant^{lxxi lxxii lxxiii lxxiv lxxv lxxvi}, informing public health response and underpinning life science initiatives including diagnostics and vaccine research and production^{lxxvii lxxviii}.
- Digital health initiatives have scaled for pandemic response^{lxxix}, offering significant value to both health and the economy across the pandemic^{lxxx}. Telemedicine has emerged as a complementary digital initiative in many health systems, building on existing or emerging digital health foundations^{lxxxi lxxxii lxxxiii}; and demonstrating the health system's capacity for large scale system change^{lxxxiv}.

Well-integrated health technologies have the potential to help alleviate the massive healthcare burden faced domestically and further afield through innovation and collaboration^{lxxxv}. For future resilience, development of contemporary technology and innovation policy frameworks will be crucial, with systems thinking providing a methodology to better understand the behaviour of complex systems and to improve the assessment of the consequences of both innovations and policy interventions^{lxxxvi lxxxvii}.

Resilience by-intervention and by-design : Measures taken during COVID-19

Resilience-by-Intervention presumes that an external resource will be available as needed to support system resilience. For Example:

- Enable Government interventions and support to safeguard strategic industries, protect against social disorder and reduce the economic effects of shocks.
- Plan for sustaining a system's critical functions by stockpiling resources and redundant capabilities outside of expected operating conditions.
- Develop real-time decision support tools integrating data and automating selection of management alternatives based on explicit policy trade-offs in real time.
- Plan to engage external resources and management agents outside of the system.

At the onset of the pandemic, policy approaches focused on:

- Containment policies, such as hygiene, distancing, and lockdown measures, and including closure or management of businesses and borders. These policies were health-oriented; however they had far reaching consequences for individuals, communities, businesses, and economies.
- Health systems policies, including increased surveillance, supply and use of protective equipment, ventilators and essential medicines, optimisation of hospital beds, mobilisation and protection of health workers, and additional financing for the health system.

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- Health and life sciences innovation, including greater use of digital initiatives for surveillance and telemedicine; and R&D for vaccine and drug development.
- Broader economic and social policy decisions, focused on communities, workers, firms, education, aged care, and mental health.

Resilience by-intervention and by-design: Measures taken during COVID-19

Resilience-by-Design builds the capacity for a system to recover critical functions after a disruption within the structure of the system. For Example:

- Ensure that systems, including infrastructure, supply chains, economic, financial, and public health systems, are designed to be resilient, i.e., recoverable and adaptable.
- Manage system topology and structure by designing appropriate concentration, connections and communications across interconnected networks.
- Control system complexity to minimize cascading failures resulting from unexpected disruption by decoupling unnecessary connections and making necessary connections visible and controllable.
- Find an appropriate balance between a system's efficiency and resilience by quantifying resilience and explicitly assessing resilience/efficiency trade-offs to guide investments.
- Ensure that the system can re-allocate resources endogenously in response to shocks, for instance by ensuring markets are efficient and provide incentives for firms to adapt production and ensuring fiscal buffers so governments can provide automatic stabilisers.

Many pandemic interventions can be seen as building on prior policy decisions which enabled various systems to adapt, understood as creating resilience-by-design.

- Health system interventions can be seen to build on prior knowledge, as well as decisions about health system coverage and financing.
- On the other hand, in many countries, healthcare response has been affected by long-term under-investment investment in public health.
- Some responses, such as life sciences interventions, have been founded on mature academic, private sector and government relationships.
- Fiscal and monetary actions built on experiences during the Global Financial Crisis.

Investing in Resilience: Singapore's Models and Policy Foundations in the Pre- COVID-19 years

Resilience-by-Intervention:

- Singapore's national priority focused on keeping the epidemic curve under control and preventing a systemic shock to the economy, with border controls, screening processes, contact tracing operations, quarantine orders and community measures adjusted to respond to evolving epidemiological developments and national infrastructural capacity.
- This was supported by cross-sectoral governance established through a multi-ministry taskforce of ministers established to oversee the COVID-19 response; and an inter-agency taskforce established to tackle specific issues that emerged; for example, clusters in foreign worker dormitories.
- Fiscal measures accompanied the implementation of public health measures to cushion the impact of the pandemic and to create a circuit break on the economy and employment. Reserves have also enabled a fiscal stimulus to cushion the economic impact from COVID-19, without having to commit to high levels of debt taking generations to pay off. The sovereign wealth fund under-wrote risks.

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Resilience-by-Design:

- Singapore's response to the pandemic has been shaped by models of governance, administrative structures and policy decisions set decades earlier.
- The SARS experience in 2003 led to investment in a public health intelligence unit, and the National Centre for Infectious Diseases (NCID), a purpose-built facility designed to strengthen infectious disease management.
- A disease outbreak plan was developed to guide a nationwide and multi-system response through escalating stages of infectious disease spread.
- Beyond health, however, both Singapore's fiscal reserves and the sovereign wealth fund have been important to enabling resilient response.
- Singapore's biomedical capabilities is an outcome of policy established two decades earlier, when Singapore embarked in 2000 on a strategy to establish itself as a regional biomedical hub, building core capabilities in terms of key human and industrial development initiatives. Development of the biomedical sector was part of a larger economic plan creating a diversified approach.

19. The integration of healthier, cleaner and more sustainable growth

This year's COP26 Summit will see an attempt to bind the global community into a commitment to achieve Net Zero emissions by 2050 to arrest the pace of climate change.

None of this will be possible without a fundamental transformation in the sustainability of the global economy and the rapid adoption by global business of a new model of 'green growth'.

As COP26 sets out a framework of reliable carbon metrics which can be adopted in the global financial system as the basis for unlocking a new era of low carbon investing, it is increasingly clear that 'cleaner' and 'healthier' growth go hand-in-hand: reducing carbon emissions on the path to Net Zero will mean a series of radical changes to accepted social and economic norms – model shift from cars to public transport and active travel, abandonment of fossil fuel energy systems and a commitment to clean growth – many of which are exactly the changes required to drive a healthier model of growth.

Rather than pursue 'healthier growth' and 'cleaner growth' as two separate and parallel priorities, each with a different set of regulatory and fiscal regimes which business must navigate, it would be far more sensible to establish an integrated approach to 'cleaner and healthier growth' based on an integrated set of metrics and models for global business to be able to work with as a framework for more resilient post- COVID-19 growth.

As companies across the globe embrace new ESG metrics, it would seem sensible to incorporate health economic resilience into existing ESG frameworks rather than create another set of reporting requirements. This is one of our key forward workstreams for the rest of this year.

20. The key role of cities, business and corporate leadership in delivering change.

Any serious harnessing of COVID-19 as a catalyst for enhanced health economic resilience through healthier, cleaner and more sustainable growth will require the active leadership of those people and organisations on the frontline of shaping the places and spaces which shape the interaction between health, economy and environment.

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The Health Resilience approach and model we are developing is designed to help guide and shape practical policy interventions.

As part of our next stage work, we will be looking to work with City Mayors and Corporate leaders from across the globe to help shape the evidence-based interventions that will be required to boost health economic resilience.

As many cities and companies embrace profound changes as part of their commitment to ‘cleaner’ growth on the road to Net Zero decarbonisation, our approach and model is designed to help ensure an integrated approach to growth metrics which:

- Agencies like the OECD can incorporate in improved global trackers
- Governments can incorporate in national statistical and public accounting systems
- Cities and mayors and communities can incorporate in their local plans
- Companies can incorporate in their ESG frameworks,

New Metrics For New Partnerships In A New Ecosystem

21. The need for clearer metrics and models to monitor and manage Health Resilience

The strengthening of global institutional commitment to healthier and cleaner growth will need a framework for measuring, monitoring and managing priorities and progress, based on clear and well evidenced indices and metrics. You can't manage what you don't measure.

Just as the GFC triggered work by the OECD and IMF and individual Governments and central banks on metrics for measuring systemic economic risk and resilience, so we suggest a similar project is needed now for health economic resilience: a set of evidence-based indicators for measuring, scoring and ranking countries Health Economic Resilience:

- The extent to which their economic growth improves the health of their population
- The strength of their Health Economy

To this end, we recommend a series of activities for getting Health Resilience properly adopted by advanced economies (and companies) through a stronger Global Commitment to Healthier and Cleaner growth by advanced economies and companies:

- Institutional commitment to Health Resilience Reporting at national and international level.
- Adoption of a standard set of Health Resilience metrics (HRx) to help governments and global corporates assess their health risks.
- Robust indices and metrics for measuring Health Resilience (HRx).
- Incorporation of a measure of Health Resilience (the value of a nation's health, the cost of disease) in public accounts.
- New approaches to health economics, with better measures of the value of interventions.
- New approaches to harness fast evolving new health technologies and digital health tools to improve both health and wealth.

New Frameworks, Models and Metrics for Resilience

The Commission received many submissions outlining how the world can better integrate resilience into its current and thinking. The Commission believes:

The OECD model of resilience by-design and by-intervention must be adopted as a framework for accommodating resilience. The Commission will take forward a body of work with the OECD New Approaches to Economic Challenges to produce a policy framework for resilience by-design and by-intervention which builds on the University of Cambridge Resilience Model, spanning health, economic and environmental systems, and including attention to resilience at the interfaces between these systems.

This work must be accompanied by new investment tools, models and metrics, focusing on how health and environment can be invested as assets for future resilience by governments, communities and businesses. The Commission will convene expert working groups to deliver:

- *Models and tools to support investment in, and identify returns from, improvement of resilience across health systems, including for public health, health security and health care, and developing new approaches to measuring the value of population health and the real cost of disease.*

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- *Identifying important initiatives, including place-based, biosecurity and built environment initiatives for future resilience; and models for investment to improve resilience across communities and businesses;*
- *Clear metrics and indicators which can be used for monitoring and managing resilience at government, corporate and community levels.*

22. The key role of private sector and public-private partnerships

Across the world business leaders are looking at the impact, lessons, implications and potential changes to business practice arising from the pandemic.

Through our Regional Hubs we are seeing clusters of business leaders coming together to consider the implications for issues such as supply chain biosecurity, people and product health passporting and the sustainability of traditional corporate practice.

In many areas this is being done in parallel with thinking about the relationship between ‘healthier’ and ‘cleaner’ growth and how COVID-19 may be a catalyst for a more sustainable model of growth and trade.

The opportunities and challenges are not spread evenly: some sectors like civil aviation are facing a genuine crisis of long-term sustainability. Hospitality businesses have taken huge hits but expect a strong rebound. Digitally enabled retailers have enjoyed extraordinary growth.

Many businesses are also looking closely at their own internal processes, systems and supply chains: from the health economic resilience of global raw material supply chains to the health – physical and mental - of their workforces and workplaces.

23. Business leadership in delivering healthier growth

Putting Health Into ESG

With the focus on the actions of government and multilateral institutions, there has been less attention in global commissions and evaluations to the impact, or role, of business both during the pandemic, and after. Prior to the pandemic, there was a strong focus on sustainability emerging through the increasing use of ESG frameworks:^{lxxxviii}

- Reporting and metrics for ESG present corporate responsibility spanning environment, social and governance factors. Arguably, environmentally responsible businesses are less exposed to systematic risks^{lxxxix}. COVID-19 has moved ESG investing strategies into the spotlight^{xc}, with a change of perspective shifting ESG scores from indicators of sustainability to measures of internal vulnerability^{xcii}.
- These issues remain, and if anything, are more imperative given the knowledge that activities which degrade the environment also impact on the emergence of viruses and disease^{xciii xciv}. With market dynamics permanently changed, corporations will not thrive if they do not focus on sustainability and health^{xcv}.

However, whilst ESG includes attention to workforce and communities associated with business activities, it does not currently incorporate a health-specific dimension or risk. As the health-related shock of COVID-19 has moved through economies worldwide, private sector activity has been severely affected by containment and mitigation policies, including lockdowns and border closures, and

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broader policies introduced over time to manage the impact of COVID-19^{xcvi}. In Asia, as well as other regions, the pandemic affected supply chains, breaking down the ability of the logistics sector to move goods, leading to disruptions to production in other connected countries. This disruption had multiplier effects up and down the value chain^{xcvii}. There is a risk of return to more protectionist approaches as a result^{xcviii}.

Corporate Resilience

Analysis of resilience, however, should pay attention not only to the impacts and interventions within systems, but also to the contributions, evolution and innovation building on existing system foundations. From a business perspective:

- Biosecurity has become an immediate concern from *both* a health and economic perspective. Hygiene is no longer a public health concern alone: it is how many businesses continue trading nationally and internationally. As such biosecurity and hygiene measures, spanning non-pharmaceutical interventions such as handwashing, mask-wearing and social distancing, to appropriate biosecurity arrangements for the movement of goods, are important to reduce current and future impacts of epidemics and pandemics, and guaranteeing the flow of trade, particularly from quarantined areas^{xcix}.
- Digital initiatives have assisted many businesses to adapt their activities; including for the workforce to work from home in lockdown conditions^c; and, therefore, digital capacity in the workforce will be an even more important future asset. The growth in working from home has changed the landscape in many sectors and can be considered a mechanism for resilience; one which has implications for productivity and the future of work^{ci}. In fact, a healthy workforce is recognised as an asset for resilience, with hygiene and biosecurity arrangements therefore becoming ever more important^{ci}.
- Private sector activity has also contributed to pandemic response efforts in many countries. For example, private health sector activities have eased pressures in some public health systems^{ciii} ^{civ}, and public-private or private sector actions have supported digital, drug and vaccine development^{cv}, becoming a *modus operandi* for resilience^{cvi} ^{cvii}.

The Role Of Business And Corporate Leadership

Delivering healthier and cleaner economic growth will not happen without corporate leadership, private sector led innovation and new models of investment. Just as global business leaders are gripping the challenge of 'cleaner growth' and the opportunities for moving away from reliance on fossil fuels to green energy and the green economy, COVID-19 has revealed the importance of business leadership in healthier growth. In a global economy where companies now operate at scale making them as powerful as nations and companies have thousands of employees in multiple nations, the role of business leadership is as vital as that of governments.

Delivering healthier and cleaner growth will require a vibrant and healthy ecosystem of innovative new entrants with new technologies and business models, products and services, and enlightened leadership by large established global majors.

Many business leaders, sector and individual businesses are recognising that healthier growth and cleaner growth are closely aligned. Many businesses are recognising that the combination of COVID-19 and climate change will require bold new thinking about sustainable growth. Governments can assist the progress by developing common policy frameworks and metrics to support business leadership.

24. The need for a new Health Resilience Index

Tackling the structural weakness of both the lack of policy architecture for addressing – and the underlying causes of – a lack of health economic resilience exposed by COVID-19 must be central to global and national work towards a post- COVID-19 policy ‘reset’.

In this Interim Report we set out a series of Findings for getting Health Resilience properly adopted by advanced economies (and companies) through:

- Institutional commitment to Health Resilience Reporting at national and international level
- Adoption of a standard set of Health Resilience metrics (HRx) to help Governments and global corporates assess their health risks
- Robust indices and metrics for measuring Health Resilience (HRx)
- Incorporation of a measure of Health Resilience (the value of a nation’s health, the cost of disease) in public accounts

Just as the GFC drove the establishment of a new framework for strengthening global economic system resilience, so COVID-19 must be a catalyst for a similar strengthening of health economic resilience. The determinants of a country or city’s health economic resilience will be highly specific. What is needed in Minnesota won’t be the same as in Manchester, Munich, Mumbai or Melbourne. Each country will have different policy priorities. Just as the OECD and IFS established some common metrics and indices for assessing systemic financial resilience post-Crash, it would be enormously powerful for the OECD and G20 to establish some common Model or Index of Health Resilience to help policymakers shape interventions.

A New Approach to Health Economic Resilience

Through the work of the Commission over the last 9 months collating insights and evidence through our global network of expert Institutes and our 4 hubs, and our identification of Key Lessons from the first 16 months of the Pandemic, the Commission Secretariat at the Cambridge Centre for Public Health has started to develop a new model of Health Resilience based on the OECD concept of ‘Resilience by Design’ and incorporating the key lessons from the experience of different countries confronting the pandemic.

This Section of the Report summarises the work set out in detail in our Research Report – attached. We highlight here the key elements of our thinking and work towards our new model of systemic Health Resilience, which we believe can be a more powerful tool for policymakers to help shape new policy interventions.

Defining and Conceptualising Resilience

COVID-19 has had a wide-ranging impact within countries, affecting just about every facet of life. For this research, we have identified three key factors for understanding resilience: health, economy and environment. This builds on the work of other global Commissions and Panels which have noted the COVID-19 has had an impact on health and lives^{cviii}, economies, and has an environmental dimension as a zoonotic disease emerging from human-environmental interactions^{cix cx}.

Recognising that there is not a current definition which adequately integrates health, economy and environment, as experienced during the pandemic, the first step for the Commission’s research has been to define resilience from a systems perspective, as proposed by the University of Cambridge:

... Resilience is the process by which health, economic and environmental systems can face change and shocks in such a way that they evolve and innovate together, to continue to deliver healthy growth for the population^{cx}.

This definition is unique in that it unites health, economic and environmental systems as important together in terms of resilience. It is consistent with current recommendations of the OECD for new conceptions ‘Beyond Growth^{cxii}’. ‘We have in our modelling conceptualized ‘healthy growth’ as a long-term objective which focuses on achieving rising wellbeing and, through this, better outcomes for current and future generations.

This Report also adopts a systems model which supports this definition, as developed by the University of Cambridge CPH (‘Resilience Model’) (diagram right)^{cxiii}, which conceives health, economy and environment systems as important to overall resilience. The model envisages that these three sectors must work together (‘interface’) for greater resilience. As shown in the diagram, these interfaces help to strengthen the model overall, and span ‘Health & Economy’, ‘Health & Environment’ and ‘Economy & Environment’.

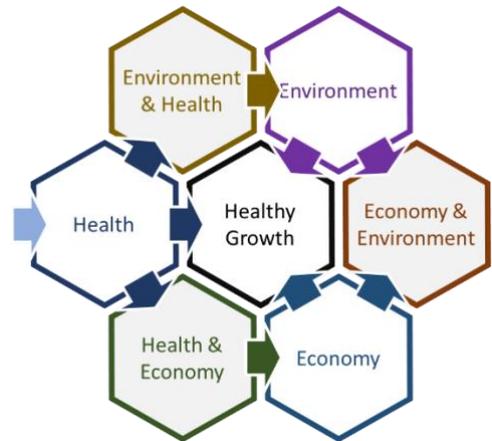


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Resilience: Lessons about interrelationships

The nascent Cambridge CPH Resilience Model in development provides a powerful conceptual framework for understanding and the complex cross-system relationships which shape resilience in a dynamic health economic system in real time (diagram right).

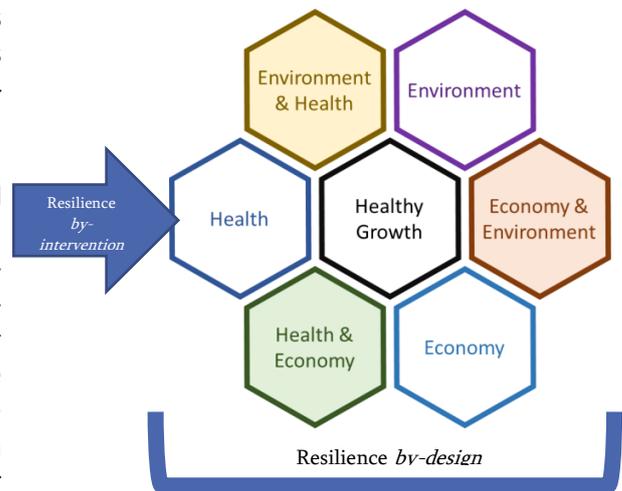


The Need for Secure Foundations: by design

Resilient systems require secure foundations, the ability to understand the current state of play and to plan, as well as the capacity to rapidly adapt and transform^{cxiv}. However, discussion about resilience often focuses on the immediate response to the shock, rather than the foundations and underpinnings required for response.

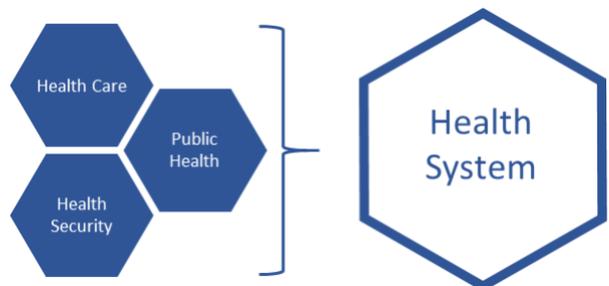
OECD New Approaches to Economic Challenges sets out an approach which beneficially categorises resilience into two related dimensions: resilience *by-design* and *by-intervention* (diagram right).

Resilience-by-intervention presumes that an external resource will be available as needed to support system resilience in the event of shock. In the case of COVID-19, this shock occurred in health. However, resilience-by-design builds the capacity for a system to recover critical functions after a disruption within the structure of the system; for example, the mobilisation of life sciences capacities and the expansion of telehealth during the coronavirus pandemic, which built on prior investments.^{cxv}



Health Systems: The cost of incoherence in design

Arguably the greatest attention has been paid to how health systems have responded to the pandemic. Research submitted to the Commission argues that differential outcomes and experiences across countries may reflect a critical lack of *within-system* coherence across healthcare, health security and public health (diagram right).



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A significant focus of immediate attention has been on health security, with interventions affected by an evident lack of preparedness in many countries^{cxvi}. Underinvestment in core health security measures led to deficiencies in pandemic preparedness and response^{cxvii}; with lack of emergency health supply stockpiles^{cxviii} the first signal that countries were unprepared, and that interventions may not be effective. For many countries, this lack of preparedness helped to escalate the spread of COVID-19.

However, it is imperative to understand that resilience and interventions were also undermined by significant underinvestment over time in population health approaches and public health systems^{cxix}, described as a 'global crisis of chronic diseases and failure of public health.'^{cxxi}

This underinvestment has been despite pre-pandemic evidence that public health measures yield a positive economic and social return on investment^{cxii cxiii}. In the first and consequent waves, population health vulnerabilities actively undermined health system efforts, with disproportionate infection rates, disease severity and mortality evidenced in populations with underlying health conditions^{cxiv cxv}. In addition, economic inequalities created higher rates of infection, disease severity and mortality in economically vulnerable populations^{cxvi cxvii cxviii}.

As a result, the worst effects of the pandemic arose in situations where healthcare systems became overwhelmed, with the number of severe cases – characterised by the effects of comorbidities and inequality on health – exceeded the capacity of available health services, seen at various times in both high-, middle- and low-income countries around the world including Europe, Brazil, the United States of America and (now) India^{cxix}. It is well understood in the global analysis of the impact of COVID-19 that healthcare systems have for many years been under-funded in many countries and/or affected by austerity measures implemented after the GFC^{cx}. This has shone an uncomfortable but powerful light on the importance of health inequalities in both population health and the resilience of a healthy economy.

Health systems are complex, and in our example, span public health, health security and healthcare. Resilient response was, for many governments, hindered by lack of coherence and coordination within the healthcare system as a whole^{cxxi cxxii cxxiii cxxiv}.

- Fragmentation within the health system required remedy across non-aligned silos of health specialties^{cxv} and national, sub-national and local governance structures^{cxvi}.
- Response in many countries required significant attention to relationships between levels and types of health services; between levels of government and health administrations; between technical experts and decision makers; and between public and private actors in health^{cxvii}.
- For greater coherence, some countries created new cross-government political structures. In Germany, for example, the conference of state and federal leaders set national health policy in the early months^{cxviii}, and in Australia a 'national cabinet' was used as decision-making forum to improve communication, co-ordination across states and territories, and joint decision making^{cxix cxl}.
- In Europe, Sweden took a radically different approach to most countries with mixed results: as with all policy responses assessing the overall impact requires an examination of both the short- and long-term impact: the truth is it's too early to judge at this stage the overall impact or success of the Swedish Approach for several years.

Focusing only on pandemic interventions – healthcare or preparedness – belies how health systems can be better designed for resilience, and the important contribution that public health and health security programmes and institutions make to health system resilience *by-design*^{cxli}.

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Case Study: The response of the European Union

The European Union (EU) is navigating its third crisis in the space of a decade, following the financial crisis and the migration crisis.

- Across EU Member States in the early onset of the pandemic, countries first focused on prioritising domestic policies and restrictive measures, hesitating to provide mutual help. The result was that the pandemic response was everything but coordinated: EU countries closed their borders unilaterally without harmonisation based on Schengen area rules. In addition, they followed very different strategies against the virus with little if any inter-state coordination.
- The impact of the pandemic triggered what is considered a fast response by EU standards, reflecting the learnings of the eurozone crisis: in addition to the prompt action by the European Central Bank, the Commission made sweeping proposals in May 2020 and by end-2020 an agreement at EU level had been achieved; with the risk of fragmentation between EU countries, a wide range of multi-year investment and reform programmes were introduced.
- COVID-19 has sponsored new policy dialogue and policy mix, with the main policy innovations during the response having a very clear supranational status; for example, the Recovery and Resilience Facility within NG-EU.
- It has been the response by the EU institutions that has set the stage for recovery and potentially altered the discourse on economic policy and governance moving forwards¹. COVID-19 can therefore be seen to have created a shift in relationships, policy dialogue and institutional frameworks within the European Union. What is emerging is an institutional landscape with a greater combination of rules-based and institutional features, with the potential to lead to more effective vertical coordination.

Business Resilience: A broader understanding

With the focus on the actions of government and multilateral institutions, there has been less attention in global commissions and evaluations to the impact, or role, of business both during the pandemic, and after. Prior to the pandemic, there was a strong focus on sustainability emerging through the increasing use of ESG frameworks^{cxlii}.

- Reporting and metrics for ESG present corporate responsibility spanning environment, social and governance factors. Arguably, environmentally responsible businesses are less exposed to systematic risks^{cxliii}. COVID-19 has moved ESG investing strategies into the spotlight^{cxliv}, with a change of perspective shifting ESG scores from indicators of sustainability to measures of internal vulnerability^{cxlv}.
- These issues remain and, if anything, are more imperative given the knowledge that activities which degrade the environment also impact on the emergence of viruses and disease^{cxlvi cxlvii cxlviii}. With market dynamics permanently changed, corporations will not thrive if they do not focus on sustainability and health^{cxlix}.

However, whilst ESG includes attention to workforce and communities associated with business activities, it does not incorporate a health-specific dimension or risk. As the health-related shock of COVID-19 has moved through economies worldwide, private sector activity has been severely affected by containment and mitigation policies, including lockdowns and border closures, and broader policies

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introduced over time to manage the impact of COVID-19^{cl}. The pandemic affected supply chains, breaking down the ability of the logistics sector to move goods, leading to disruptions to production in other connected countries. This disruption had multiplier effects up and down the value chain^{cli}. There is a risk of return to more protectionist approaches as a result^{clii}.

Analysis of resilience, however, should pay attention not only to the impacts and interventions within systems, but also to the contributions, evolution and innovation building on existing system foundations. From a business perspective:

- Biosecurity has become an immediate concern from *both* a health and economic perspective. Hygiene is no longer a public health concern alone: it is how many businesses continue trading nationally and internationally. As such biosecurity and hygiene measures, spanning non-pharmaceutical interventions such as handwashing, mask-wearing and social distancing, to appropriate biosecurity arrangements for the movement of goods, are important to reduce current and future impacts of epidemics and pandemics, and guaranteeing the flow of trade, particularly from quarantined areas^{cliii}.
- Digital initiatives have assisted many businesses to adapt their activities; including for the workforce to work from home in lockdown conditions^{cliv}; and therefore, digital capacity in the workforce will be an even more important future asset. The growth in working from home has changed the landscape in many sectors and can be considered a mechanism for resilience; one which has implications for productivity and the future of work^{clv}. In fact, a healthy workforce is recognised as an asset for resilience, with hygiene and biosecurity arrangements therefore becoming ever more important^{clvi}.
- Private sector activity has also contributed to pandemic response efforts in many countries. For example, private health sector activities have eased pressures in some public health systems^{clvii clviii}, and public-private or private sector actions have supported digital, drug and vaccine development^{clix}, becoming a *modus operandi* for resilience^{clx clxi}.

Communities: Understanding place-based resilience

Communities and individuals within them have been critically and disproportionately affected by health, economic and environmental factors and risks related to the pandemic.

Access to healthcare for all in need is a major challenge in many countries, where sub-national and community health disparities in access to healthcare represented a threat to health system sustainability and resilience^{clxii}. If individuals are unable to access healthcare in their local communities, there is a greater risk to the community and the broader population of the risk of transmission, which could lead to, accelerate or prolong an epidemic^{clxiii}.

- While some countries coordinated care at local levels based on current practices, in other countries co-ordination mechanisms were not sufficiently developed, highlighting hospital-centric systems^{clxiv}. In some countries, local public health authorities had been underfunded over lengthy periods of time^{clxv clxvi}.
- Allocation of emergency health financing did not always take account of local care needs, nor address known inequalities in local communities^{clxvii}.
- However, there have also emerged examples of local health innovation for resilience. In France, local networks provided valuable information systems, generating local level data to support healthcare providers and patients, and thereby assuring the resilience of the healthcare system^{clxviii}.

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Beyond health service provision, many communities have been impacted by localised economic effects, including unemployment^{clxix}. Understanding place-based resilience is critical given economic inequality has complicated efforts at epidemic prevention and control, exposing certain populations to health-related hazards^{clxx}. With current indications that prospects for future growth vary widely across countries and sectors^{clxxi}, place-focused actions will continue to be critical.

- Private sector actions will be important at community level. In some countries in Asia, private sector foundations are expanding financial access and education in rural areas, as well as technology and digital access^{clxxii}. There are also complementary policies that enable social connection and self- and collective efficacy to minimise these impacts and promote community resilience^{clxxiii}.
- For future resilience, attention can be given to methods which improve both health and environment resilience, such as a greater community focus on reducing reliance on private transport, encouraging greater individual and community exercise^{clxxiv}; and the local production and distribution of healthy food^{clxxv}.

Investing in Resilience

Investments focused only on *resilience-by-intervention* are unsustainable over the longer term, and they do not guarantee continued system survival^{clxxvi}. In addition, financing to address resilient actions *by-intervention* will be a significant challenge, especially where there exist fiscal constraints^{clxxvii}.

Resilience *by-design* builds the capacity for a system to recover critical functions after a disruption. Systems require secure foundations to rapidly adapt and transform^{clxxviii}.

- Pandemic preparedness is an important aspect of investing in resilience *by-design*. Many countries, however, including those assessed as having capacity, were in fact unprepared, with low stockpile reserves^{clxxix clxxx}.
- In some countries, health insurance was responsive by-design; with health insurance reimbursements expanded to accommodate new service interventions, such as the use of telemedicine^{clxxxi clxxxii}. In Singapore and Germany, financial reserves were also used to cushion the economic impact from COVID-19^{clxxxiii clxxxiv}.
- The focus on investing in emergent interventions rather than in the foundations of preparedness has arguably affected international development assistance, with global development financing for preparedness at low levels prior to the pandemic^{clxxxv}, and donor governments therefore having to adapt their development assistance approaches to support greater COVID-19 response^{clxxxvi}.

This lack of investment in key health strategies prior to emergency reflects a broader issue that health expenditures are considered a cost to the economy and are therefore not considered productive. As such, health system contributions to the economy may not be accounted for in financial decision-making, even though contributions by the health sector can be more than 10% of total GDP^{clxxxvii}. This contrasts to the way in which digital, data and life sciences are often invested as productive economic sectors, with longer term investments which have been crucial to promoting resilience during the pandemic^{clxxxviii clxxxix cxc}.

However, as the pandemic shows, where health systems – including public health, health security and healthcare – are not in working order, they fail to provide an adequate buffer against the onslaught of disease. **Health systems could be considered an essential infrastructure or asset and be invested in for resilience *by-design* and *by-intervention* will be a challenge.**

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Current policy and investment frameworks may therefore not be adequate to create multi-system resilience^{cxci}. To this end, many of the submissions to the Commissions provided examples about how decision-making tools can be improved to focus on multi-system resilience, with a specific focus on better integration of epidemiology and economic approaches highlighted because of the pandemic.

- **Cost-benefit analysis (CBA)**, a commonly used tool, can under-represent risk and ignore distributional impacts^{cxcii}. CBA could be better adapted for specific use in emergent situations, to include integrated economic and epidemiological perspectives for analysis of options and allocations^{cxciiii cxciiv}.
- **Integrated investment analysis**: More broadly, investment decision making criteria for policy appraisal could better include multi-criteria analysis, with the criteria incorporating resilience alongside other policy goals, such as sustainability. For example, policy makers struggle to assess both health and economic effects in a unified approach; and therefore, more work is needed on how to integrate epidemiological with economic research^{cxcv}.
- **Re-envisioning macro analysis**: there is a need for macro-economic models to better integrate dynamic disease transmission models^{cxcvi}. In addition, better estimating health and health-economy shares of GDP, as well as labour force shares for health, may yield important observations for policy makers making investment decisions focused on resilience, with particular importance placed not only on health, but on contributions at the ‘Health & Economy’ interface of the Resilience Model^{cxcvii}.
- **Finally, investment models could better consider how both public and private sector incentives** can align within common policy frameworks. Public health has been kept separate from corporate influence; however, collaboration could be beneficial to improve both quantitative and qualitative models needed to drive future investment^{cxcviii}.

Models and Metrics

For investment approaches to be updated to focus on resilience *by-design* and adapt their approaches to health system investments, new models must be developed based on a richer understanding about how modern, integrated systems work^{cxciix}. There have been calls from the international development community in the past to develop metrics for multi-system resilience, recognizing that disasters, shocks and stresses present cross-system challenges^{cc}.

New models and metrics should build on, or add to, what already exists. There is a plethora of metrics available for individual systems including health, environment and economics. These focus on discrete targets within health, environment and economy, including thirteen targets underpinning the overarching goal to ‘Ensure healthy lives and promote wellbeing for all at all ages’^{ccix}.

- The SDGs also include targets which span multiple systems in the Cambridge Resilience Model – for example, targets related to essential medicines and vaccines and R&D have a strong economic relationship^{ccii}.
- Further, with a focus on health, experimental indices, such as the UK’s Health Index^{cciii}, have developed metrics focused on an integrated range of cross-system indicators. This type of approach shows how sets of existing metrics can be used to develop a more comprehensive understanding of resilience.
- In contrast, methods such as the Global Health security Index, focus on a *within-health* system dimensions, with a strong focus on health security, some analysis of health coverage and attention to population health as part of its risk assessment. This index is currently under review considering pandemic experience^{cciv}.

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Interdisciplinary and other multi-dimensional perspectives promoting *by-design* health resilience models should work to incorporate a wider range of values that structure the selection of metrics.

- The University of Cambridge provided a conceptualisation as to how metrics may be grouped, based on their multi-system resilience model, to provide an overall understanding of resilience.
- The concept is that, in a multi-system model, key metrics may be aggregated to provide indications of overall resilience. However, taking a multi-system view of resilience requires that the assumptions which underpin models and metrics be reviewed.

Next Phase work to our November Summit

Over the coming 6 months to our Final Report and global Summit in November, we will be exploring the issues identified in this interim Report; to better refine and define the key indices and metrics which might form the basis of an HRX model which the OECD, G20 countries and global business might usefully be able to incorporate to help boost health economic resilience.

In particular, we plan to further explore:

- The issues raised by leaders of health, business and public policy through each of our Regional Hubs
- The issues suggested by our Model as fundamental to shaping Health Economic Resilience
- The insights of a range of City Mayors across different global regions
- The extent to which Healthier Growth and Cleaner Growth may support each other
- The appetite of the OECD, G20, National and Local Governments to incorporate more robust models of Health Economic Resilience
- Lessons from the post-crash reforms to the global financial systems
- Data on the full economic cost of the pandemic in different countries and sectors
- Data on the differential impact of pre-existing population health in COVID-19 susceptibility
- The potential of different econometric models in helping to assimilate the various indices and metrics identified by our research
- How to identify those factors which the data suggest are universal across the globe in determining the health economic resilience of a population or economy, and those which apply only to certain geographies, and those which are particular to specific economic models.

Our Collaborations

Our Work With The OECD

The Commission has received enthusiastic backing from the OECD and has held discussions with several departments, with an offer to present its findings both internally and to the external members. The OECD's New Approaches to Economic Challenges (NAEC) initiative has worked closely with the Commission research team in considering how a systems-based approach to resilience can enhance population health. The Commission's Research Director, Anneke Schmider, recently took part in a webinar focusing on building Systemic Resilience.



New Approaches to Economic Challenges

The Commission has built strong ties with the OECD around their expertise in the creation of econometric models. As complementary organisations for promoting the reconceptualization of systems resilience, the Commission hopes to build on the work of the New Approaches to Economic Challenges team in advocating for a systems-based approach to health, economic and environmental resilience.

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The Partnership for Health System Sustainability and Resilience

We are delighted to be part of the Partnership for Health System Sustainability and Resilience with AstraZeneca, the LSE and the World Economic Forum.



Partnership for Health System Sustainability and Resilience

Founded by the World Economic Forum,
London School of Economics and AstraZeneca

Over the last six months we have worked closely with the research teams on the PHSSR project. The aim of the Partnership is to make a significant contribution to the long-term safeguarding and improvement of global health, particularly in two respects:

- **Sustainability:** The ability of a health system to withstand internal and external stresses (epidemiological, economic, social, political and environmental challenges) in order to maintain and continually improve performance of its functions and achievement of its goals.
- **Resilience:** The ability of a health system to prevent, withstand and rebound from short-term shocks in order to maintain and continually improve performance of its functions and achievement of its goals.

The Commission will continue working with the PHSSR, supporting its activities in building up a database of case studies on health system sustainability and resilience at national level. The PHSSR and Commission will work together to advocate for a new thinking regarding Health Systems and the necessary policy implementations to enhance existing systems.

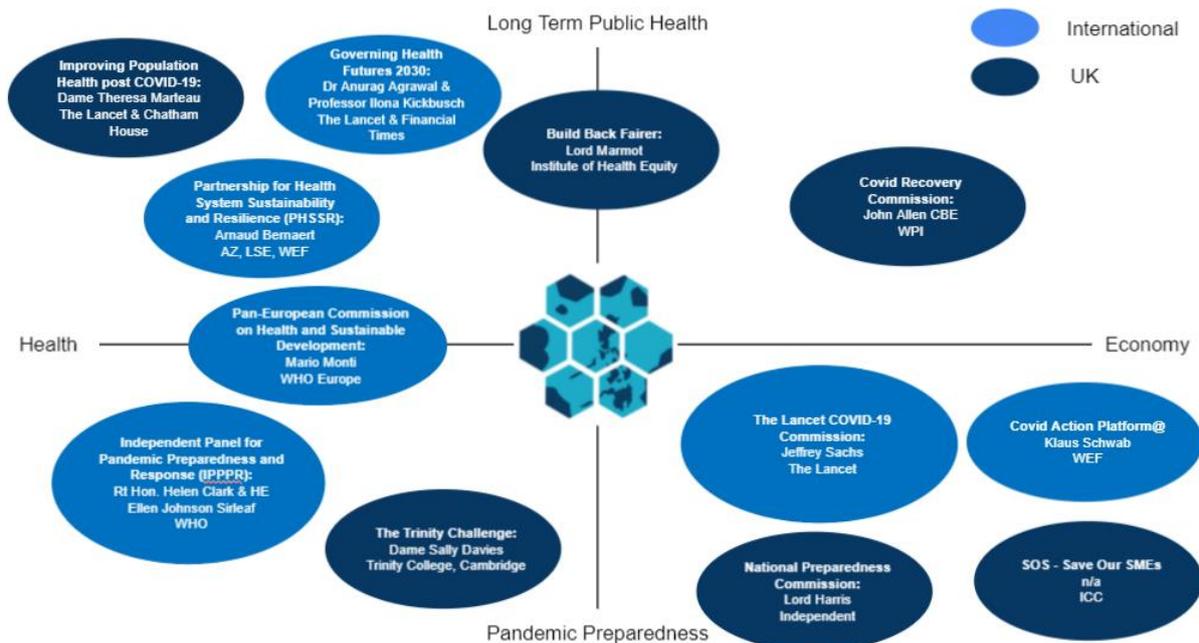
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A Global Alliance: Collaborating With Other Commissions

There is significant global work being undertaken in other Commissions and Panels considering long long term population health and more short term pandemic preparedness, notably:

- The Independent Panel for Pandemic Preparedness and Response chaired by Helen Clark and Ellen Sirleaf^{ccv};
- The Pan-European Commission on Health and Sustainable^{ccvi};
- The Lancet COVID-19 Commission^{ccvii}.



The Reform for Resilience Commission is fundamentally collaborative and has sought and continues to seek to build working alliances with initiatives in the field to maximise our policy impact across the global stage.

The Resilience Summit: November 2021

At our November Summit we will submit our Final Report and Recommendations.

Annex 1: Footnotes

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